the OIL AND GAS JOURNAL
PUBLISHED WEEKLY APRIL 10, 1961

WHAT'S COOKING IN WASHINGTON

A look at the five big issues that concern oil

- Fuels study
- Federal agencies
- Gasoline tax
- Minimum wage
- Depletion

p. 66

Annual reports show

Strong second half made 1960 a good year

First quarter of '61 expected to be a bright profit period. p. 61

Five ways to recover stored LPG from salt caverns

p. 117

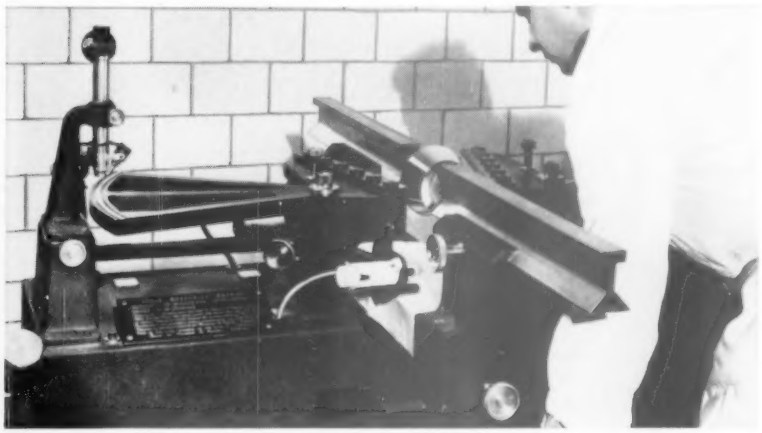
Automatic pipeline welding fast becoming a must

p. 122

Trouble ahead—if industry doesn't keep oil finders

p. 153

This Cabot 456D-256-120 pumping unit is designed to run for years with little attention. That makes it vital for bearings on the gear reducer's slow speed shaft to take heavy loads, position shafts—be practically maintenance-free. That's why Cabot Corporation, Machinery Division, specified Timken® tapered roller bearings. "In fact", reports Cabot, "our pumping unit gear reducers were Timken bearing-equipped on the first design—have been through the years because of trouble-free operation." Their tapered design lets Timken bearings take radial and thrust loads in *any* combination. No clamping devices are needed for inner or outer bearing races. Tight fits are used for both races, and exact running clearances are set after assembly. This permits accurate location of the shaft and gear, resulting in better performance, lower maintenance.



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OIL AND GAS JOURNAL
Vol. 59, No. 15

Contents April 10, 1961

THE WEEK'S NEWS

General Interest:
Last Half Pickup Made 1960 Good Year for Oil Profits . . . 61
How Oil Issues Are Shaping Up in Washington . . . 66
FPC Eliminates Rate-Base Evidence in Area-Price Hearings . . . 68
Military Will Barter Farm Surplus for Foreign Oil Purchases . . . 69
FPC Modifies Stand on Escalation Clauses . . . 70
Industry Briefs . . . 73
Natural-Gas Fuel Cells May Someday Supply Home Power . . . 74

Drilling-Production:
Ocean Drilling Passes First Test . . . 72
Development Program Will Double Size of Alaskan Field . . . 76
Deep Quake Damages Wells in California's Wilmington Field . . . 80
Waterton Gas Reserves Put Field Up With Canada's Largest . . . 80

Pipelining:
West Shore Products Line Construction to Begin in June . . . 70
Pipeline Briefs . . . 81
First Results of Search for Higher-Strength Pipe Reported . . . 82
Mid-America Plans Two Branch Extensions . . . 82

Processing:
Processing Briefs . . . 77
Gulf-East Coast Gasoline Stocks Hit All-Time High . . . 80
Argentine Plant Will Be First to Use New HDA Process . . . 81
Huge Petrochem Barges Will Move Refrigerated Propane-Ammonia . . . 81

Foreign News:
New Try for Agreement Made in Iraqi Oil Dispute . . . 84
Arabian Oil Won't Get Preferential Treatment on Khafji Oil . . . 87
Shell International Tests Streamlined Gas Dispensing System . . . 88
Foreign Briefs . . . 88

Exploration:
U. S. Firms Will Make First Irish Tests . . . 65
Commercial Scouting May Spread to Gulf, Southeast, East Texas . . . 77
Louisiana Offshore Lease Sale Will Offer Old and New Acreage . . . 79
Shortage of Geologists May Be Shaping Up, API Speaker Warns . . . 153
Old East Texas Gas Field Becomes Important Oil Area . . . 154
March Multiple Completions . . . 157

REGULAR FEATURES

Advertisers' Index . . . 177
Book Review . . . 120
Calendar of Events . . . 50
Classified Advertising . . . 175
Drilling Contractors . . . 149
Drilling Statistics . . . 169
Editorial . . . 59
Equipment Men . . . 142
Exploration Highlights . . . 153
Foreign News . . . 84
Foreman's Page . . . 95
Journally Speaking . . . 57
Markets . . . 172
New Equipment . . . 131
Personals . . . 164
Production . . . 170
Refining Statistics . . . 171
Selected Monthly Data . . . 173
Statistical Summary . . . 168
The Journal Said . . . 57
They Say . . . 42
Trade Literature . . . 140
Watching Washington . . . 69
Who's Who in Oil . . . 164

Technology-Operation section on next page →

The Oil and Gas Journal is published weekly by The Petroleum Publishing Co., 211 S. Cheyenne, Tulsa 3, Okla. Second-Class postage paid at Tulsa, Okla. Copyright 1961 by The Petroleum Publishing Co. United States and foreign rates to the petroleum industry, 1 year $6, 2 years $9, 3 years $12.

TECHNOLOGY—OPERATION

Drilling-Production

Automation at Northeast Purdy 96

By W. B. Bleakley

Push-button lease operations at this big field include 40 test centers at 27 different locations throughout the field and LACT to pipelines at four different points. Thirteen of the test stations handle production from more than one unit.

First Diesel-Electric Rig for Canadian Drilling 100

By R. H. Bullied

Versatile unit is expected to be pace setter for Cascade Drilling's rig fleet. The unit, which lends itself to winterizing and air transport, is working in the Inverness area of Swan Hills field.

Oil-Well Pumping—38 128

By Joseph Zaba

Prime movers: Internal-combustion engines.

Pipelining

Automatic Pipeline Welding is Increasing 122

By Robert S. Ryan

This trend is receiving added impetus from the development of new steels of very high tensile strength, and it appears that maximum potentialities of manual arc welding have been reached.

Refining-Processing

Automatic Filter for Cooling Tower 103

WPRA Panel Answers Questions on Cat Reforming 104

Expert anwers to questions asked by men operating cat-reforming units.

Get Top Service From Your Electric Motors 113

Look for these four things in your effort to improve electric-motor service: (1) faulty lubrication practices, (2) improper alignment with driven unit, (3) overloaded bearings, and (4) defective safety and protective devices.

Where We Are on Making Propylene 115

By H. A. Mitchell

Development of new processes using propylene as raw material and assurance of adequate supplies are creating new interest in propylene derivatives.

Recovering Stored LPG Without Enlarging the Cavern 117

By C. T. Brandt

Brine displacement, pumping, vaporization lift, gas displacement, and cavern operated as a gas accumulator are the five ways to accomplish this aim.

Fan Shaft Machined in Place 127

General

Thermoelectricity—A New Demand for Natural Gas 93

By Carl Lawrence

Gas can now be converted to electricity in four ways: (1) fuel cell, (2) thermoelectric generator, (3) thermionic converter, and (4) magnetohydrodynamic converter.

The OIL AND GAS JOURNAL Newsletter

Tulsa, Okla.
April 10, 1961

Signs multiply that oil pulled off a good first quarter for 1961:

The latest—production gained 0.5% over same period last year, and well completions increased by 482.

Domestic crude production for the quarter averaged 7,230,400 bbl. daily compared with 7,197,200 in same months of 1960. March production made the difference after output in first 2 months trailed.

Well completions for the quarter total 11,277. That compares with 10,795 last year. Completion rate hit 937 last week, highest weekly total since January and the third week in a row that completions have increased.

▼ ▼ ▼

Optimism for 1961 runs high in annual reports of 1960 business now being received by oil-company stockholders (p. 61)*.

Executives report the momentum generated in the last half of 1960 is carrying into 1961.

Factors responsible:

Price improvement in the last half of 1960; big boost in sales of natural gas and natural-gas liquids; increased emphasis on producing and marketing high-priced products; and the effects of economy moves and tighter management.

These trends also are noted in the reports:

Profits generally were up.

Operational volumes were up for crude, gas liquids, refinery runs, and product sales. Drilling was off sharply as management became more selective in exploration.

Capital spending leveled off.

Oil, despite its profits, ranks only 25th among industrial groups in the return on net assets. It was 40th in 1959.

That's result of a study of National City Bank of New York which showed profits of 125 oil firms averaged 10.2% return on net assets in 1960.

Leading profit makers: Drugs and medicines 20% return; soaps and cosmetics 17%; Autos and trucks 15.8%; soft drinks 15.6%.

▼ ▼ ▼

Here's the current outlook on Capitol Hill:

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*Refers to article in this issue giving more details. When no page is given, the item is a Newsletter exclusive.

Fuels study is still up in the air but probably will be settled during the current session.

Gasoline tax is yet to be fought out. Question is whether it will drop to 3 cents, stay at 4 cents or rise to 4.5 cents.

Depletion issue remains ominously quiet with foes just waiting for an opportune time to attack.

Regulatory agencies are due a shakeup aimed at speeding up work.

Minimum wage may face new showdown in Senate where administration forces will try to restore cuts given Kennedy bill by House (p. 66).

The Washington beat:

Tentative dates for the crude oil import hearings to be held by Interior are May 4 or 5 in California and about 10 days later in Washington.

Two basic questions will be discussed at the hearings: Whether controls are still needed; and if so, what changes could be made to improve the present program.

It's certain now: L. J. O'Connor will continue as Oil Imports Administrator. Watch for an official announcement in a few days.

An oil company official will be the next president of the U. S. Chamber of Commerce. He's Richard Wagner, Chicago, board chairman and chief executive officer of Champlin Oil & Refining Co.

Wagner favors a tax overhaul aimed at encouraging venture and investment capital as a long-range stimulant to growth of U. S. economy.

▼ ▼ ▼

Drillers have learned one big lesson from successful coring on the Mohole project: Wells can be drilled in ultradeep waters off the Continental Shelf.

Global Marine drilled a core hole in 11,700 ft. of water, says it can drill a wildcat well in same depth. This would permit exploration almost anywhere in the world (p. 72).

The wildcat pace in Alaska is picking up.

New location has been staked on the Kenai and another is expected to be spotted soon. Union plans to drill the 23-15 Sterling unit about midway between its Kenai unit gas field and Swanson River field. This will be the first test on the Sterling unit. California Standard reportedly has staked location on the Swan Lake unit east of Swanson River, but has made no official anouncement. Both tests should begin within 2 months.

Two important wildcats are now drilling in Alaska. The 1 Falls Creek being whipstocked under Cook Inlet is nearing total depth. It was drilling below 13,640 ft. last week. And Pan American's Bethel basin test was drilling below 1,177 ft.

In Australia, Union Oil is testing several intervals in 1 Cabawin which was taken to total depth of 12,035 ft. Union had a strong

gas kick when drilling at 9,935 ft.

The Cabawin wildcat is about 100 miles southeast of Associated Australian Oilfields' gas discovery made last year. Kern County Land and Australian Oil & Gas Corp. own a piece of Union's concession.

▼ ▼ ▼

Oil men are making the sulfur market tougher.

Sulfur recovered from petroleum and natural gas keeps pouring on the market adding to a price squeeze that began several years ago with new Mexican production.

Result: Prices for export have dropped from $31 per long ton, f.o.b. vessel to $25. Domestic prices have declined from $26.50 per long ton, f.o.b. producing site to $23.50 (p. 68).

The Japanese refining market is really booming.

Demand is expected to reach 1,790,000 bbl. daily in 10 years, an increase of more than three times over last year. The refining industry will require an investment of $2.64 billion over the decade to keep up with surging consumption (p. 87).

Excess-gasoline problem at Aramco's Ras Tanura refinery is being solved by reinjecting surplus naphtha into a producing formation of Qatif oil field.

Aramco is recycling about 5,200 bbl. daily of naphtha. It's cheaper to return the naphtha to formation than to build storage, and eventually the naphtha will be recovered as part of the crude it enriches.

▼ ▼ ▼

Refrigerated shipment of light hydrocarbons and petrochemicals may change some traditional concepts of plant location and supply-demand for certain materials.

Barge shipment of refrigerated propane and ammonia in atmospheric pressure tanks at minus 28° F. was revealed last week by Phillips Petroleum.

Refrigerated tank-car shipments of liquid oxygen and anhydrous hydrogen chloride are being made by others. Chances are the practice will spread to light hydrocarbons and petrochemicals.

A possibility: Refrigerated tankers for the Gulf Coast-Eastern Seaboard run. Refrigerated shipment of propane, ethane, and other light gases in liquid form will fill the much needed experience gap between shipping at ambient temperatures and liquid methane temperatures.

Prospects of a fuel cell based on natural gas are encouraging, according to a research team of Chicago's Institute of Gas Technology.

Success in the project would mean that fuel-cell power packs may be economic for supplying all or most of the electricity requirements of a home. It would open a vast new market for natural gas and provide counter measure to electricity's drive for a larger share of the nation's space-heating business (p. 74).

Market Memo

April 10, 1961

Sharp cut in refinery runs is beginning to show results.

Runs averaged 7,855,000 bbl. daily last week, off 42,000 bbl. from week before and down 619,000 bbl. over the last 4 weeks.

Result: Key product stocks eased off. Gasoline stocks dropped 219,000 bbl. and distillates 1,126,000 bbl.

Best part about the refinery slowup: It came on the Gulf and East Coasts where oversupply was worst. East Coast runs were down by 207,000 bbl. daily last week and the Texas Gulf down 111,000.

Product markets generally are quiet. Only changes: Posted price of distillates and kerosine dropped one-fourth cent on the Gulf. Mid-Continent suppliers restored a half-cent cut on gasoline.

New Gulf Coast prices on distillates are 9 cents for No. 2 and 9.625 for kerosine. Old prices had shown uneasiness with discounts of one-fourth to three-eighths cent for spots prevalent. There's no activity to test gasoline prices, but traders believe that firm buying orders would get one-fourth cent off for regular gasoline and three-eighths to one-half off for premium. No. 6 is holding at $2.20 but there are five to six cargoes of the material available. The real story is that majors who usually buy on the Gulf are well supplied on all products, and demand as a result is flat.

The gasoline market is bright in the Mid-Continent area. The new posting of 12.5 cents for regular appears firm. Spot discounts are not easy to get and are only flushed by real volume orders. Gasoline inventories are in good shape, and refiners hope that a pickup in April buying will add new strength to the market. Demand for No. 1 and No. 2 is seasonally quiet with discounts of one-fourth cent available from the 9-cent posting for No. 2 and 10 cents for No. 1.

River markets are exceptionally sluggish. Suppliers in midriver are quoting one-fourth cent over Gulf Coast low for gasoline, but trade talk is that a firm order might get the material at one-fourth off the Gulf low.

The East Coast distillate market is quiet following the end of March price cuts. There is evidence of hand-to-mouth operations in anticipation of a further drop.

Spotty changes mark the gasoline situation. The Miami price war which dropped dealer tankwagon prices to 8.4 cents a gallon for regular, ended with prices returning to 15.9 cents. Esso has rescinded its price raise in the Carolinas. Mobil cut dealer tankwagon prices by 0.9 cent in Maine to meet competition.

Marketers generally are optimistic that the nervous stock situation will improve by May because of top level attention on the problem.

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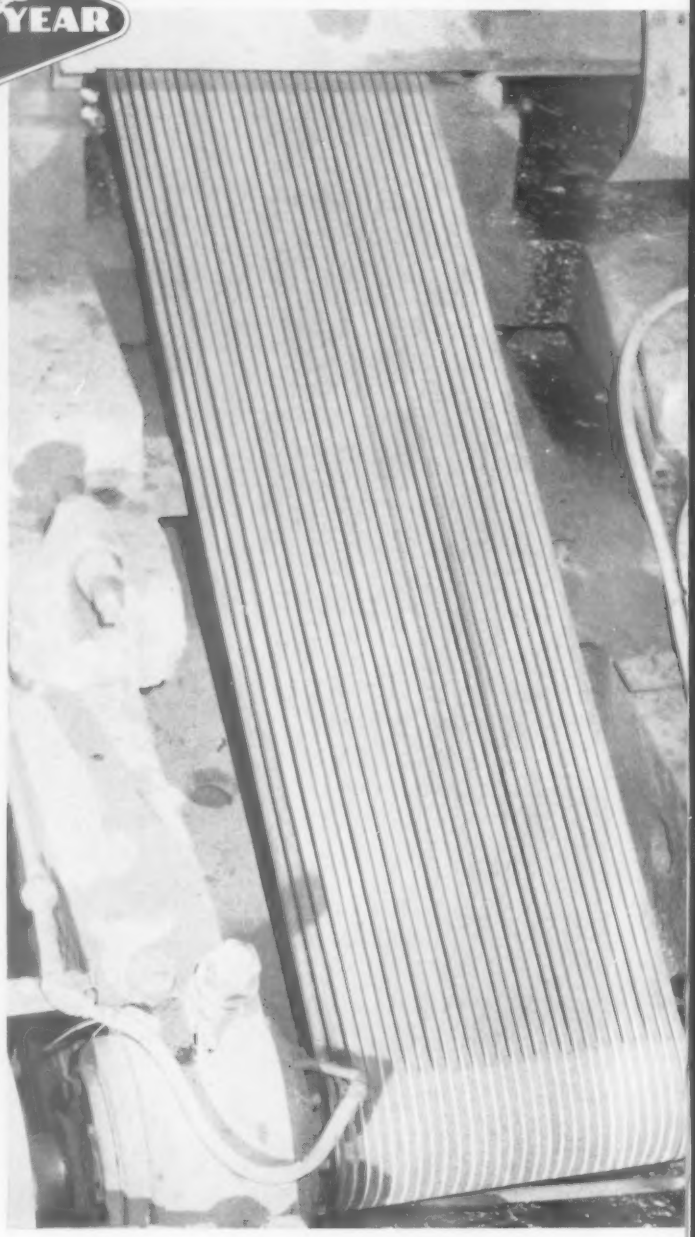
Goodyear V-Belts' precision matching comes from this exclusive close-tolerance matching equipment that length-codes each belt to 1/32". Most other belt manufacturers code only to 1/10".



Goodyear V-Belts' precision matching assures standout performance. Example: only 28 COMPASS-V-Steel Belts handle this big steel saw, normally calling for 42 belts. Result: the steel mill saved $500 at the original installation — will save more at every belt change.

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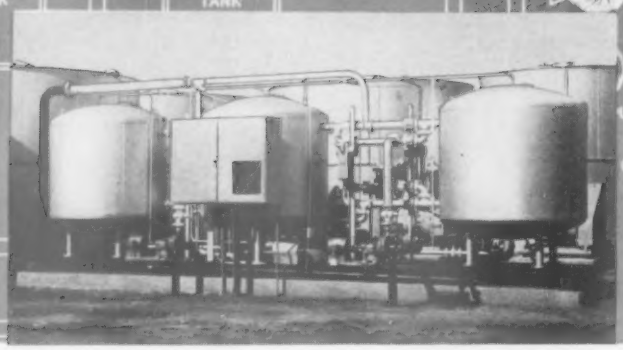
PUSH BUTTON WATERFLOOD



On an Illinois waterflood, this Phantomatic Filter Unit includes weatherproofed control box, three 7' x 5' graded bed filters, pumps, hydromotor operators, valves, and piping. Controller operates from pressure switches on filters and storage tanks.

Packaged . . . skid-mounted . . . automatic . . . controls fully weatherproofed . . . BS&B PHANTOMATIC Water Filter Units are engineered to meet the customer's specific requirements.

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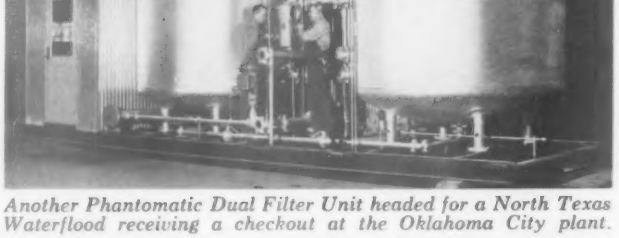
For your copy of BS&B's new AQUA-KLEENER brochure, write Black, Sivalls and Bryson, 7500 E. 12th Street, Kansas City 26, Missouri. Dept. 1-A4A.



Another Phantomatic Dual Filter Unit headed for a North Texas Waterflood receiving a checkout at the Oklahoma City plant.

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OPERATOR SAVES THOUSANDS OF DOLLARS ON DEEP WORKOVER!

And Service Contractor Makes A Fair Profit, too!

This well had been drilled to 16,700′, plugged back to 16,036′ and completed in the open hole. A packer had been set in the 7″ casing above the plug. In working over the well, the packer was milled-over and retrieved, the plug was drilled out from 16,036′ to 16,200′ and a 5″ liner was set from 15,551′ to bottom. A total of 16,200′ of 2⅞″ drill pipe was used for the job. It was necessary to pull over 200,000 lbs. hook load in recovering the milled-over packer.

The work was performed by Nomad Drilling and Servicing Company with a Cardwell KM250 Drive-In Rig.

The operator selected this particular rig because of its capabilities and low cost, considerably less than the cost of a conventional drilling rig. The KM250 has shown outstanding ability to keep up with conventional drilling rigs normally used on medium and deep workover jobs. The operator stated that, in comparison, the KM250 saved 50% on moving-in and rig-up costs and upwards of $75 per day on day work.

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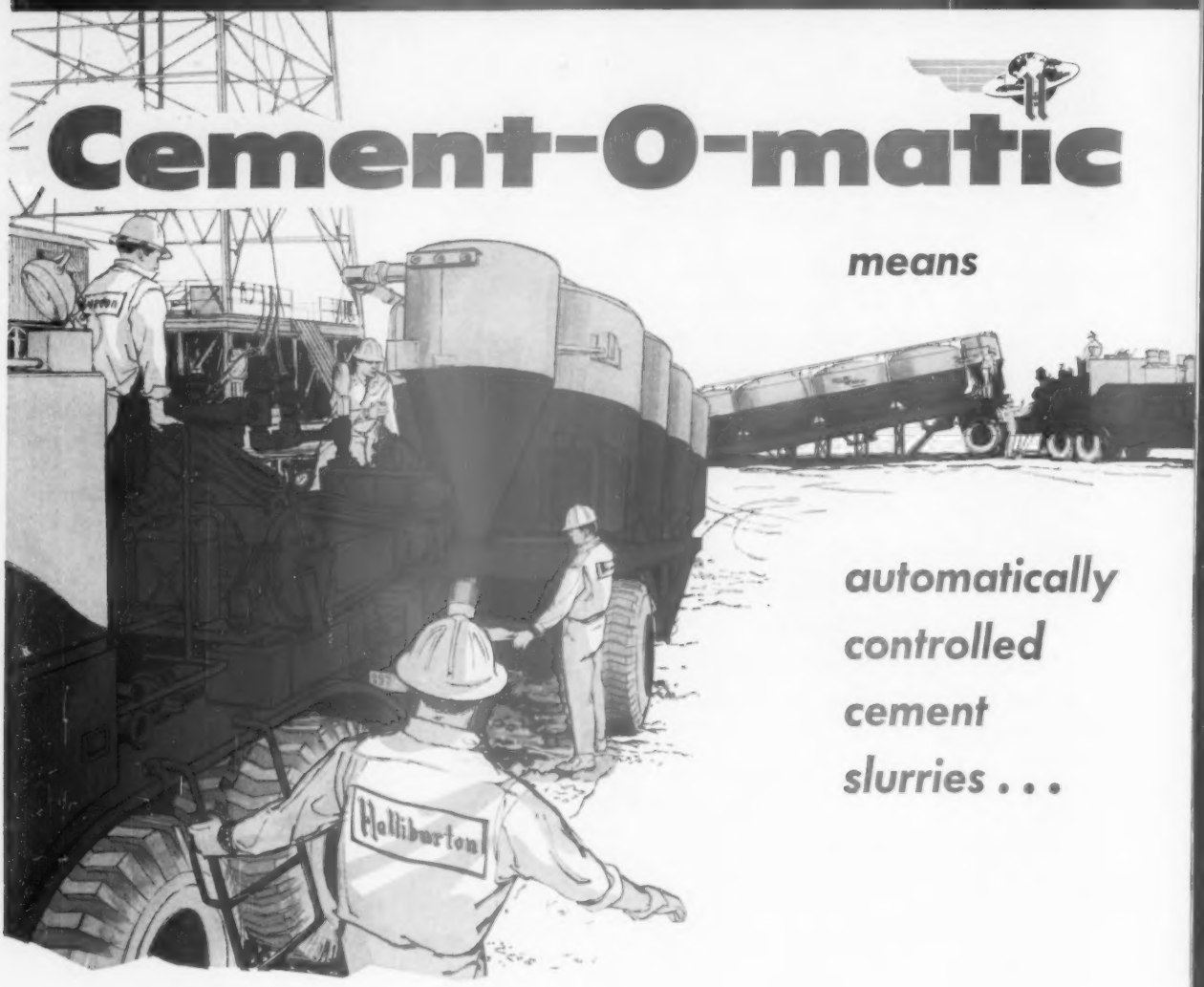
means

automatically controlled cement slurries . . .



a new Halliburton development!

"CEMENT-O-MATIC" is Halliburton's new automated slurry mixing system for primary and remedial cementing. It is designed to:

- AUTOMATICALLY MAINTAIN a constant preselected slurry weight.
- CONTINUOUSLY MEASURE the weight of cement slurry and indicate the flow rate.
- INSTANTLY INDICATE the total flow at any point during the cementing job.

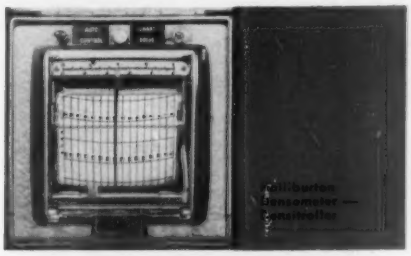
The new automatic instruments which make "Cement-O-matic" possible are the Densometer, Densitroller, Flow Meter, and Flow Analyzer — all developments of Halliburton research. The "Cement-O-matic" slurry mixing system represents another Halliburton achievement in the search for *better* cementing services and techniques . . . a more uniform cement slurry can now be placed which helps eliminate weak "troublesome" spots in the cement column . . . the position of cementing plugs can be more easily determined during a cementing operation and the cement location can be more accurately checked during plug back or squeeze operations.

Revolutionary improvements such as the Cement Jet Mixer, developed by Halliburton nearly 40 years ago — Bulk Cementing, special cements, cement additives and Pneumatic Bulk Cement Handling Equipment, pioneered by Halliburton — and now "Cement-O-matic" . . . these are but a few examples of how Halliburton applied research works for you to increase the efficiency of your service dollar.

1 monitors the slurry density

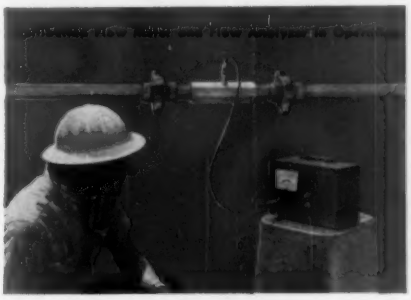
A slurry sample is continuously passed through and measured by the DENSOMETER. Within ten seconds after *any* change in density is noted by this sensitive instrument, pneumatic pulses reflecting the change are signalled to the Densitroller, which then acts to return the slurry to the pre-selected weight. The Densometer/Densitroller team can maintain a density accurate to within ± 0.1 pound per gallon throughout its entire 6 to 21 pounds per gallon range.

2 automatically controls slurry density



The new Halliburton DENSITROLLER is the controlling instrument which maintains the cement slurry weight desired. This weight is pre-set on the Densitroller by the operator. The instrument then controls the system to maintain this pre-selected weight automatically, regardless of changes in flow rate and/or pressure. With the Densometer and Densitroller both in use, the pre-set density can be changed by the operator at any desired point during the job by resetting the density selector. The slurry weight is continuously recorded on a strip chart.

3 measures slurry flow rate



The Halliburton Turbine FLOW METER and FLOW ANALYZER makes possible the determination of the cementing plug's position at any time during the cementing job. Also, in plug back or squeeze operations, the cement position can be more quickly and easily calculated at any time. These calculations are based on the continuous gpm flow rate and cumulative total flow readings displayed by the Flow Analyzer. This data is obtained by the Turbine Flow Meter which is installed directly in the slurry flow line, and continuously transmits the data to the Flow Analyzer.

Ask your Halliburton man about the availability of "Cement-O-matic," the new automated cement slurry mixing system.

CEMENTING SERVICES

275 Service Centers ...just minutes away from your well!

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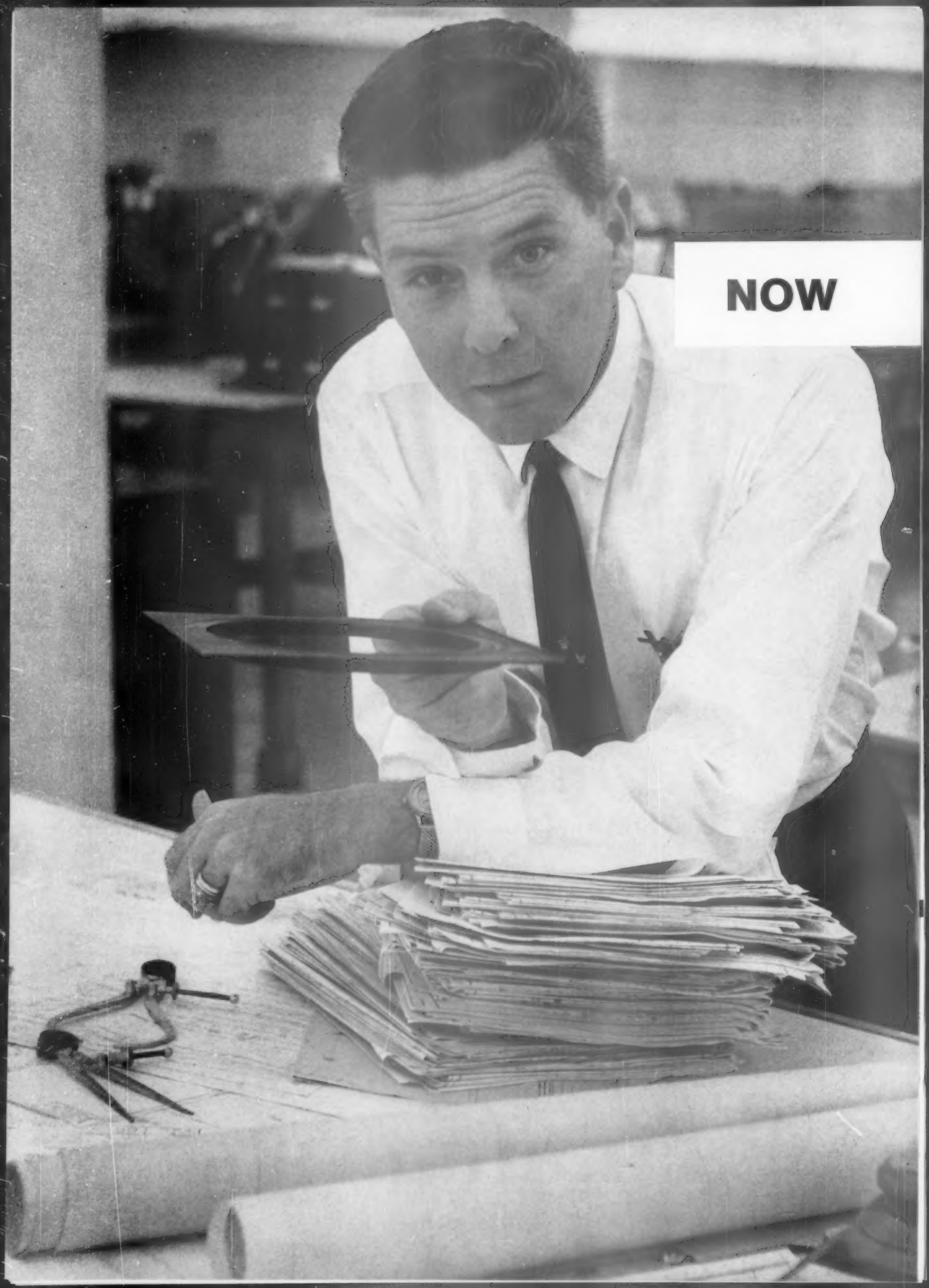
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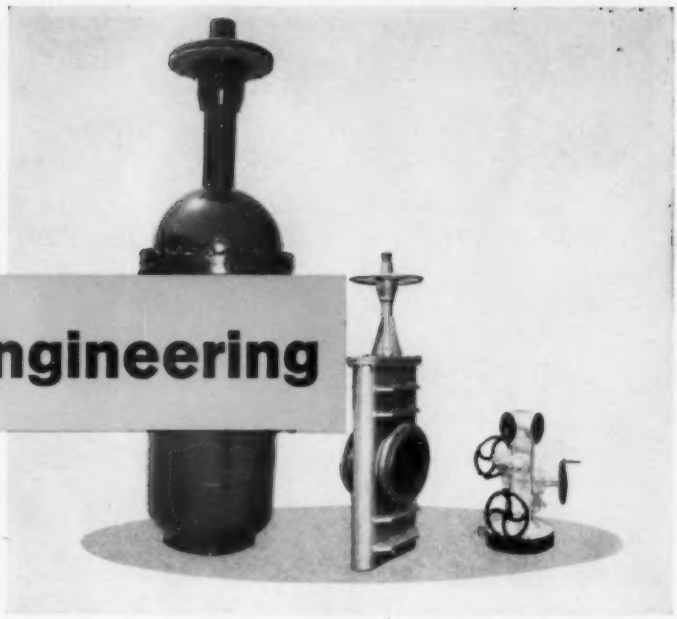
TOTAL Valve Engineering



Left to right above, W-K-M's new: *Safe-T-Seal* Gate Valve (ASA); Pressure Sealing Gate Valve (ASA); Cross-type Triple Gate Valve (API).

112 IDEAS FOR THIS ONE W-K-M PART

New valves are being developed to outperform any you've ever known

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Under wraps in W-K-M's Research and Development Laboratory are experimental valves looking like none you've ever seen . . . prototypes being tortured to simulate a lifetime of hard service. And, in restricted field installations, new models with no marking or identification, are making their final test runs.

W-K-M's exhaustive research and development program is a vital part of TOTAL Valve Engineering—W-K-M's unique dedication to *all* phases of valve technology. From it come today's valves and valves of the future . . . designed to work better, last longer . . . on the world's toughest jobs.

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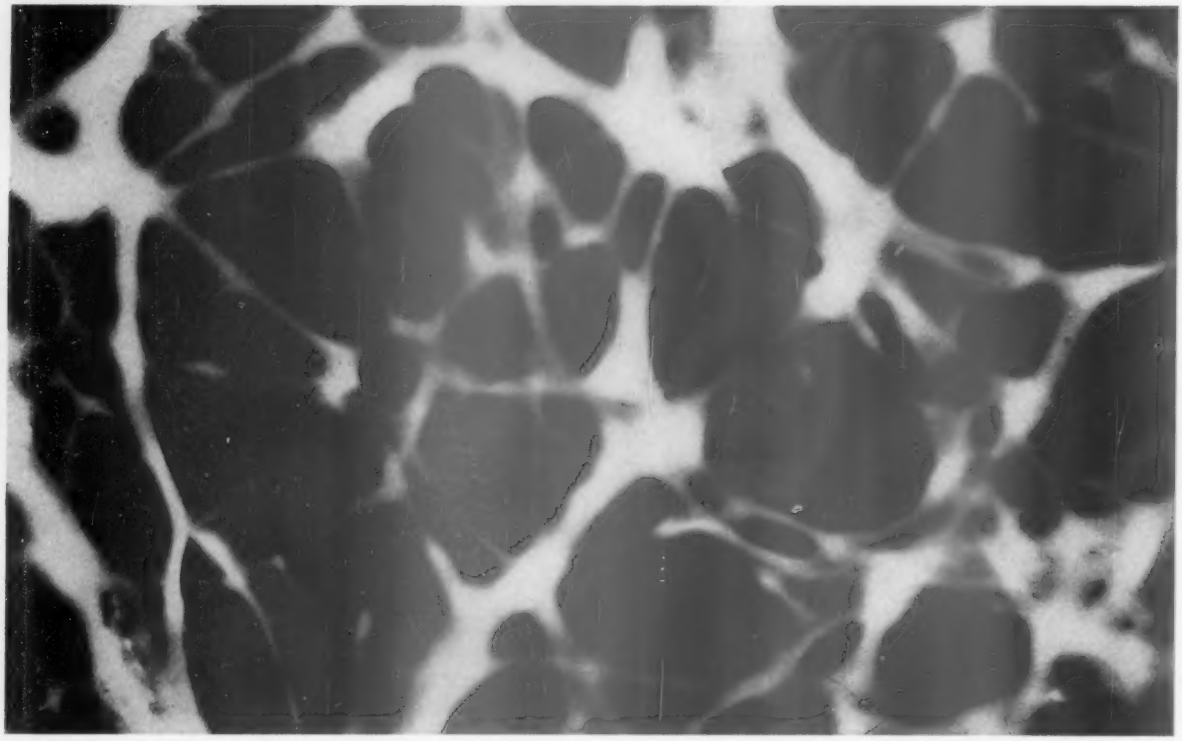


electron micrograph shows why Slick Water reduces pumping horsepower losses during well treatments

This electron micrograph shows an 11,000-time magnification of the polymer in Slick Water*, Dowell's friction-reducing agent for water. An agent providing a similar effect is also available for acid. ☐ Notice the structure of the polymer. It is believed that the polymer confers an elastic behavior which suppresses the usual turbulence of fast-flowing fluids. This action saves much of the energy lost by random turbulent motion and reduces friction in the pipe.

This means lower fluid friction and greater pumping efficiency

What can Slick Water do for you? It all depends on your well and your treatment requirements.

In some cases, it means that you may need only one pump truck instead of three for fracturing or acidizing. You pocket the saving!

In some cases, it may mean that you can get the benefits of high-injection-rate fracturing without having to pull tubing.

In other cases, it may mean that you can attain desired injection rates, yet stay within the pressure limit set by the strength of the casing.

In still other instances, it may mean that you can perform larger, higher-rate treatments and profit from bigger production increases.

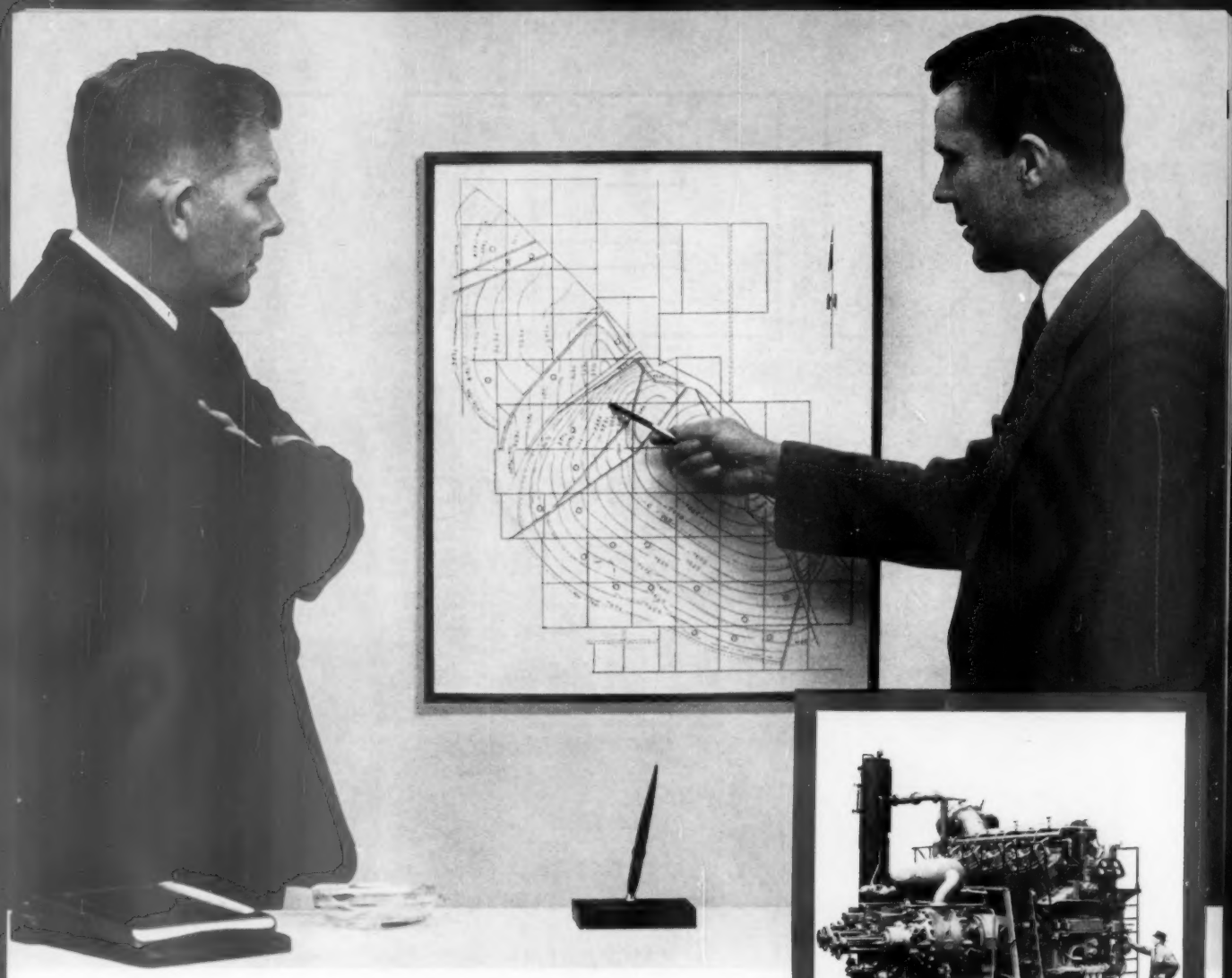
And sometimes, it may mean that you can use a lower cost fluid – again reducing treatment costs.

Dowell friction-reducing agents have helped operators get lower treatment costs and greater production increases. As your Dowell representative for more information. Dowell services and products are offered from more than 150 offices and stations in the United States, Canada, Venezuela, Argentina, Germany, France and the Sahara area. Dowell, Tulsa 1, Oklahoma. *DOWELL TRADEMARK

SERVICES FOR THE OIL INDUSTRY

DOWELL

DIVISION OF THE DOW CHEMICAL COMPANY

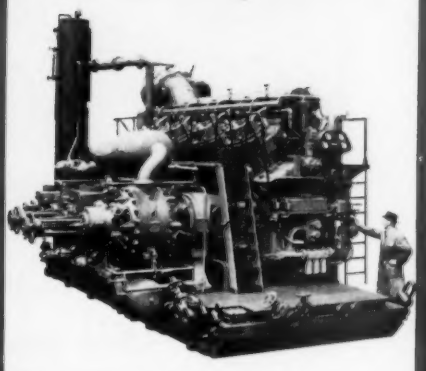


From Attic Oil to Retrograde Condensation . . .

C-B/S Compressor Plant Designs Solve Your Problems in Gas Injection

To build a compressor plant, whether it's 100 bhp or 1,440 bhp, to operate with economic efficiency in a gas injection system, the manufacturer must be able to recognize and understand your problem. C-B/Southern builds compressor plants which meet the complex requirements of artificial recovery such as pressure maintenance, cycling, and other secondary recovery operations. Here is experience drawn from building more than 40,000 compressor horsepower last year, much of it for gas injection systems, and the years C-B/S people have spent as oil and gas engineers. That is why C-B/S knows how to design and build the compressor unit that works most economically and most efficiently with your gas injection system.

And remember: C-B/S compressors are available in sizes from 100 to 10,500 horsepower.



This 1,440 horsepower plant is capable of handling more than 6½ MMCFD with injection pressures up to 5,000 psi. It is now in use in a major producing area.

CB/S

PACKAGED COMPRESSORS

CB/S

C-B/SOUTHERN, P. O. BOX 19267, HOUSTON 24, TEXAS, HOmestead 8-5441

A division of The Cooper-Bessemer Corporation

MANUFACTURERS OF PACKAGED COMPRESSOR PLANTS FOR GAS GATHERING, GAS LIFT, GAS INJECTION APPLICATIONS

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low-cost,
high-potency
fuel oil additive

polyflo 120™

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Correct selection and most effective use of petroleum inhibitors and additives involves expert analysis and consideration of many factors. As specialists for over a quarter-century, UOP is able to provide unparalleled field service, brought to you by a member of our staff of Product Sales Engineers®. For detailed information on the UOP family of superior inhibitors and additives call or write our Products Department.

- Especially suitable for treating

  No. 2 HEATING OIL and DIESEL FUEL BLENDS

- Maintains fuel oil stability through seasonal storage—even in high summer heat
- Highly effective as color stabilizer—sediment inhibitor—anti-emulsion agent
- Enhances action of other additives, such as copper deactivator
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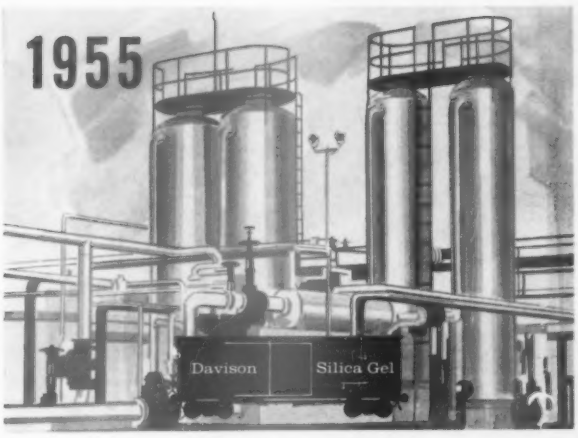
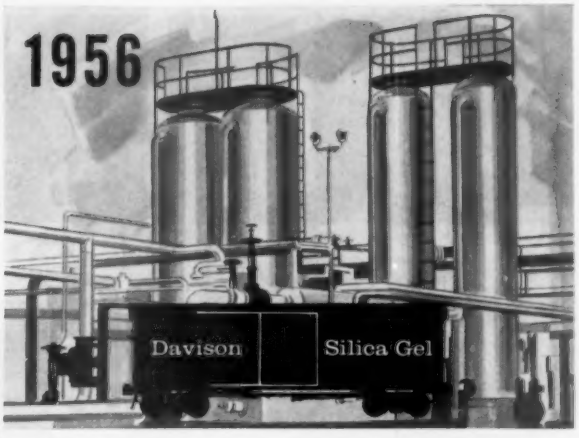
UNIVERSAL OIL PRODUCTS COMPANY
30 Algonquin Road, Des Plaines, Illinois, U.S.A.
WHERE RESEARCH TODAY MEANS PROGRESS TOMORROW





Because it can actually repay its cost . . .

Davison Silica Gel for natural gas drying has more than tripled in use in only 6 years!

Last year over three times as much Davison Silica Gel was installed in natural gas drying operations as was sold in 1955! 320% increase . . . in only 6 years. The growth hasn't stopped yet. More and more natural gas processors are switching to Davison Silica Gel.

Why? Davison Silica Gel can actually repay your cost of natural gas drying with recovery of valuable hydrocarbons. The large surface area and pore volume of Silica Gel attain recovery efficiencies up to 95%, producing as much as 3 gallons of usable pentane-plus per 100 pounds of Davison Silica Gel.

Regeneration is easy and almost total. Some installations are still on stream without change after seven years, others three or more. For natural gas drying, hydrocarbon recovery, drying of cracked refinery gases, ethylene and propylene, Davison Silica Gel's high purity and greater capacity make it the ideal desiccant. For complete information, write today:

GRACE

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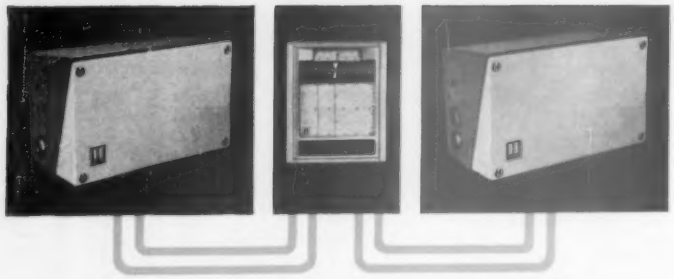
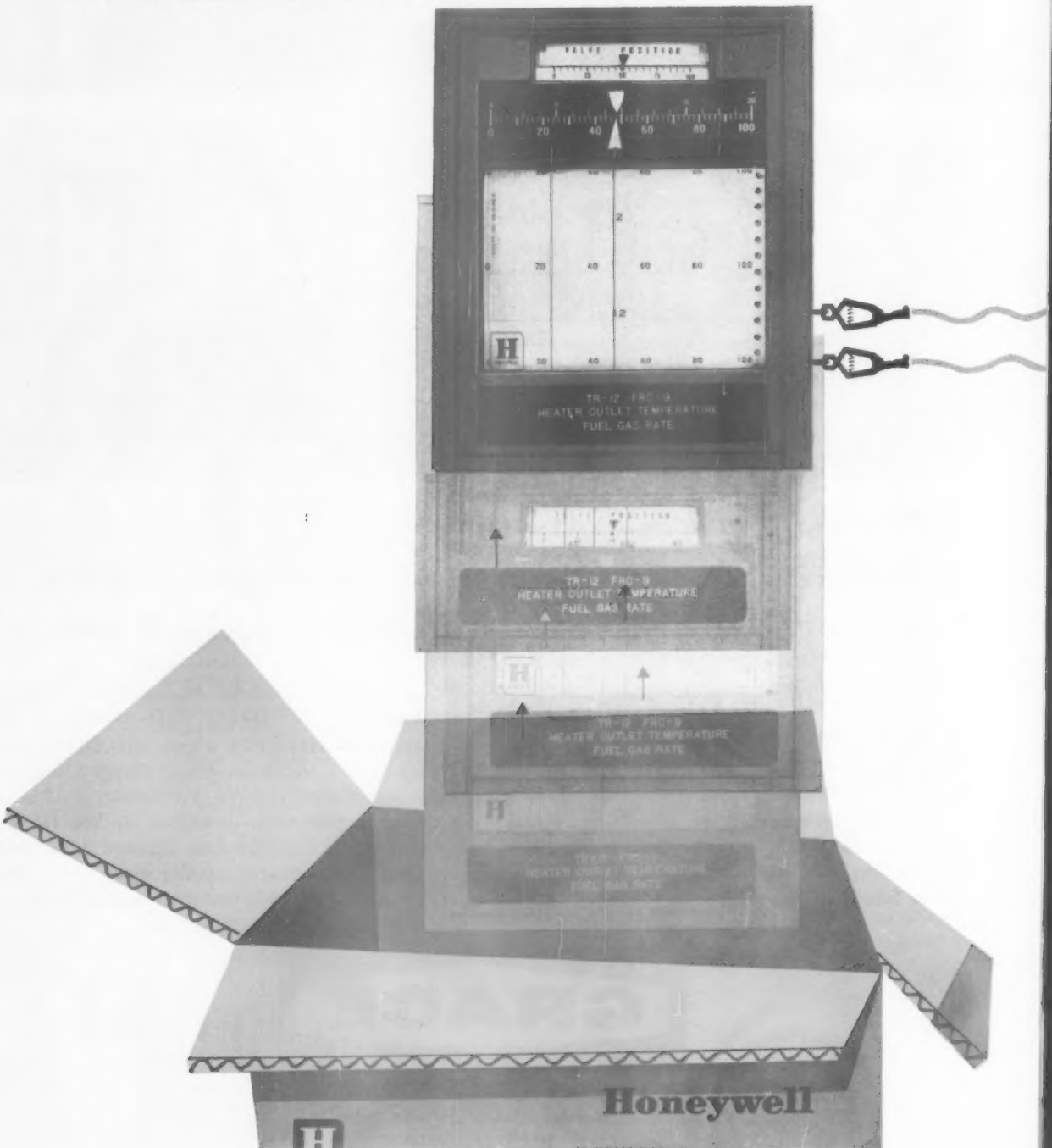
Industrial Chemicals Dept. 3104
Baltimore 3, Maryland



***ElectriK Tel-O-Set*—the true 2-wire system**



This "Loop Snooper" adds to the extraordinary ease of installation and maintenance you'll find in the *ElectriK Tel-O-Set* System. It's a portable test instrument that can accurately check . . . from the control panel . . . any *Tel-O-Set* unit in the field, to make sure signals are being received and sent exactly as they should be. Or it can operate and check a recorder chassis, indicator chassis or controller on the bench, with local power. The "Loop Snooper" removes trial and error from installation and maintenance.

SIMPLEST TO INSTALL, ADJUST AND MAINTAIN

The *ElectriK Tel-O-Set* System has many features that save time in getting on stream, and keep maintenance to a minimum. For example, all process connections are isolated from the inside of *Tel-O-Set* transmitter and transducer cases, so that you can mount, pipe and wire the instruments without removing their covers. Instrument chassis can be removed for servicing without breaking any external process or electrical connections. Standardized parts and extensive use of quick-connect and plug-in design cut downtime and spare parts requirements.

No external power is required at any field-mounted *Tel-O-Set* instrument; line power is connected only at the receiver. Two-wire d-c transmission eliminates shielding and further reduces installation costs. The 4-20 milliamp signal range gives a *live* zero through the use of readily available reliable transistors.

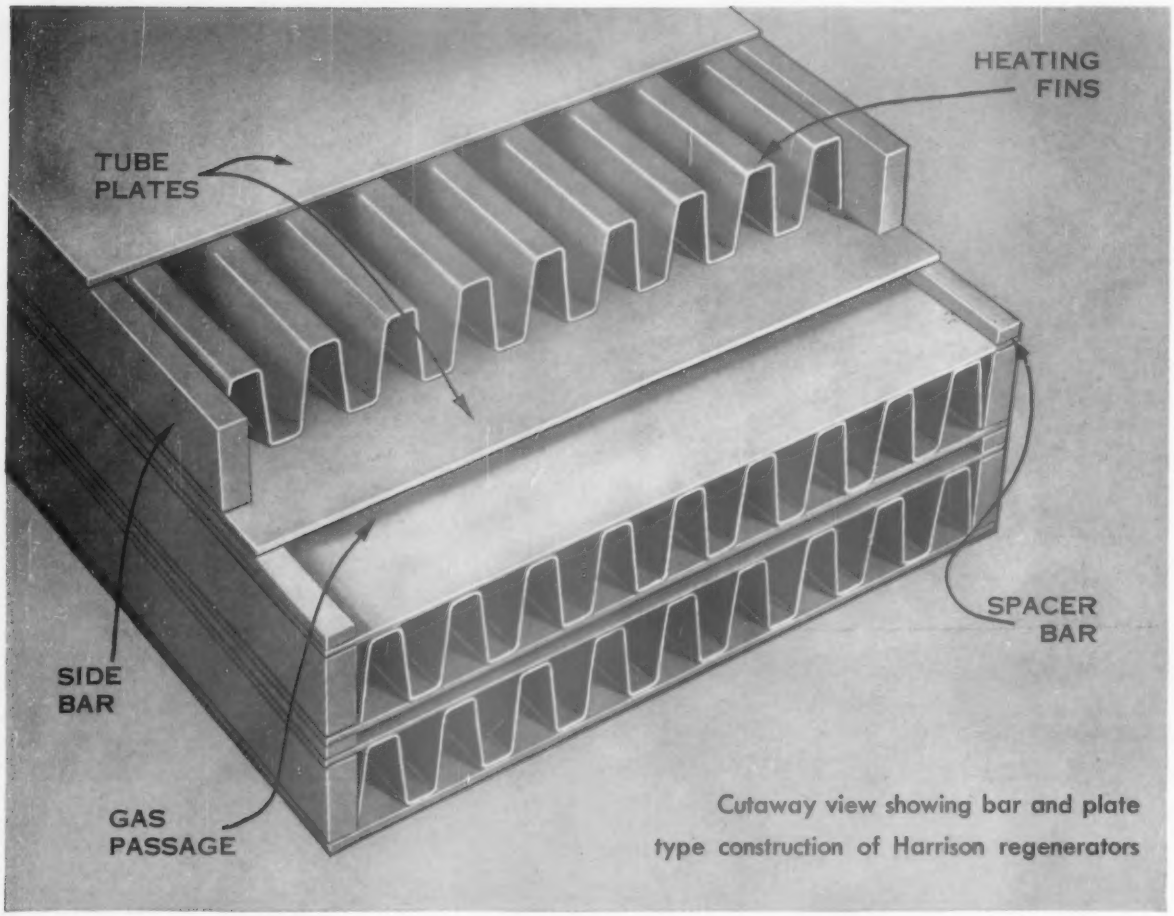
Your nearby Honeywell field engineer can tell you how *ElectriK Tel-O-Set* advantages relate to your particular control requirements. Call him today . . . he's as near as your phone. Or write to MINNEAPOLIS-HONEYWELL, 21 Penn Street, Fall River, Massachusetts.

Honeywell

First in Control

SINCE 1885

HONEYWELL INTERNATIONAL Sales and Service offices in all principal cities of the world. Manufacturing in United States, United Kingdom, Canada, Netherlands, Germany, France, Japan.



Cutaway view showing bar and plate type construction of Harrison regenerators

GM HARRISON BAR AND PLATE REGENERATOR

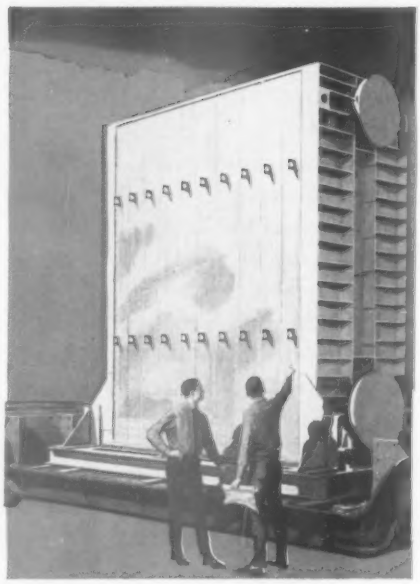
PROVIDES MAXIMUM RELIABILITY FOR GAS TURBINE INSTALLATIONS!

Saves Weight . . . Space . . . Erection Costs!

More than 500 design configurations were thoroughly analyzed by Harrison engineers before they were convinced that this type was the optimum for compactness and efficiency.

Such care pays off. For this regenerator's reduced size and lighter weight permits smaller foundations. In fact, more than a week of field erection time was saved on installations now in operation.

What's more, maximum reliability is designed into every component of this regenerator . . . the same "measurable excellence" that typifies all Harrison products. This kind of reliability is a direct result of Harrison's 50 years of experience in the heat transfer field, and Harrison's constant aim to make the finest possible heat exchangers.



GM HARRISON — TEMPERATURES MADE TO ORDER

AIRCRAFT, AUTOMOTIVE, MARINE AND INDUSTRIAL HEAT EXCHANGERS

HARRISON RADIATOR DIVISION, GENERAL MOTORS CORPORATION, LOCKPORT, NEW YORK

From Du Pont...TETRAMIX* for greater refining flexibility

In the brief few months since the introduction of Du Pont TETRAMIX* antiknock compound, refiners have found that it offers a new degree of flexibility in their choice and use of lead antiknocks. For example, while its effectiveness varies with gasoline composition (as is true with other antiknocks as well), TETRAMIX is generally effective in low, medium and high dosages.

Results of tests to date indicate that TETRAMIX is also a more effective antiknock in some fuels than either tetraethyl or tetramethyl lead —that is, a given octane number can, in such fuels, be obtained with lower concentrations of TETRAMIX than with TEL or TML.

Based on this refining flexibility and the potential savings it offers in blending, TETRAMIX antiknock compound has already won refiners' acceptance. With commercial quantities available, now is the time for *you* to investigate the potential advantages of TETRAMIX.

Because you have a choice of all three major lead antiknocks at Du Pont, you'll get impartial help in selecting the best one for *your* gasoline stocks. Your Du Pont Petroleum Chemicals Division representative can assist you in evaluating the relative merits of TEL, TML and TETRAMIX.

E. I. du Pont de Nemours & Co. (Inc.), Petroleum Chemicals Division, Wilmington 98, Delaware.

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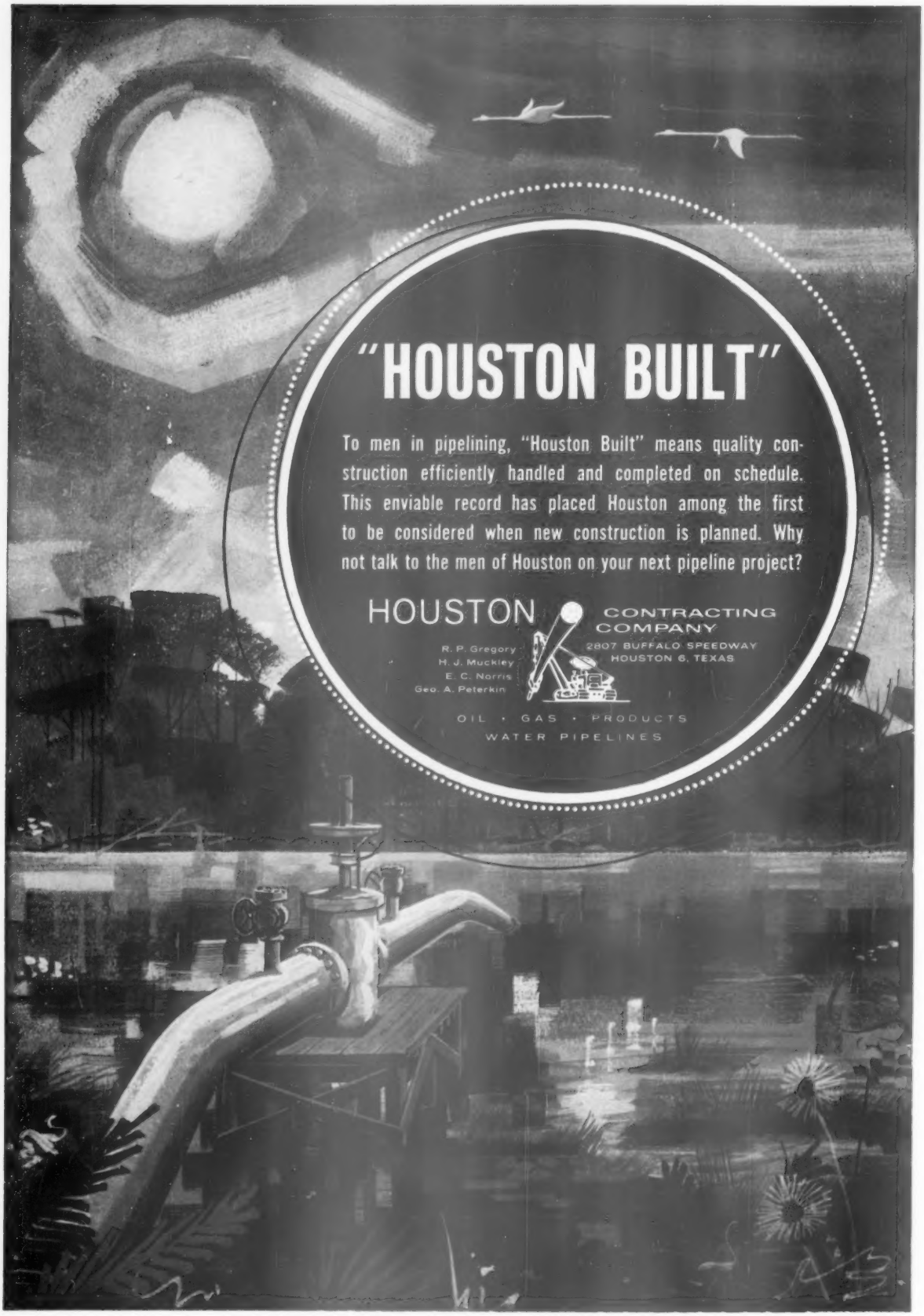
Better Things for Better Living
. . . through Chemistry

Lead Antiknock Compounds *and other* PETROLEUM ADDITIVES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To men in pipelining, "Houston Built" means quality construction efficiently handled and completed on schedule. This enviable record has placed Houston among the first to be considered when new construction is planned. Why not talk to the men of Houston on your next pipeline project?
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This man is saving money by *not carrying* an electric motor inventory. Just what is he saving? (1) Warehousing expense; (2) the cost of getting the motor to the well at the right time; (3) the aggravating delays when warranty service is required. Continental's quoted prices from stock save you these costs and worries . . so take a hard, close look at manufacturer's direct-shipment prices.

Only Continental gives you the extra value of *Warranted Application* . . a guarantee which covers *size required* in addition to the normal motor manufacturer's guarantee . . and every Continental-Emsco Green Triangle Motor has the exclusive power-saving balance meter.

You can save money, too, by ordering motors from well-stocked Continental stores as needed. Call a Continental man and talk motors.

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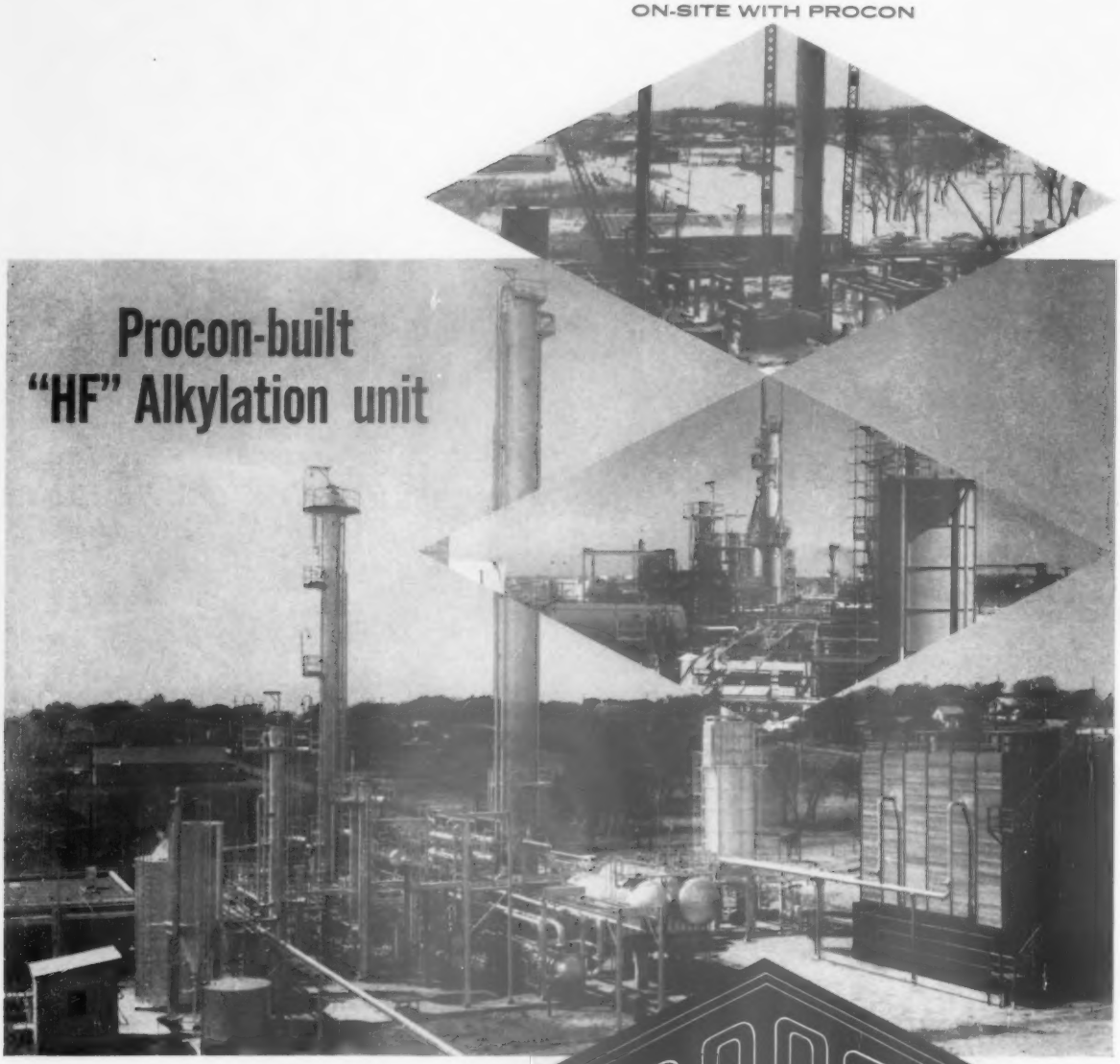
ON-SITE WITH PROCON



Procon-built "HF" Alkylation unit

... on-stream ahead of schedule

Maintaining schedule during the construction of a processing unit requires the precise co-ordination and timing of a series of design, engineering, procurement and construction details. But to complete ahead of schedule requires the extras in experience . . . in judgement, that save minutes and days. A right decision . . . a proper procedure . . . a new technique, these are the *experience factors* that help PROCON build better and on time.

Procon completed this "HF" Alkylation unit, built for Midland Cooperatives, Inc., days ahead of schedule. Midland located in Cushing, Oklahoma, uses the high octane alkylate to supplement its premium gasoline.

Turnaround, unit revamping, one unit or a complete refinery from the ground up . . . whatever your requirement you can trust the entire job to PROCON.

WORLD-WIDE CONSTRUCTION FOR THE PETROLEUM, PETROCHEMICAL, AND CHEMICAL INDUSTRIES

PROCON *Incorporated*

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PROCON LIMITADA, SAO PAULO, BRAZIL
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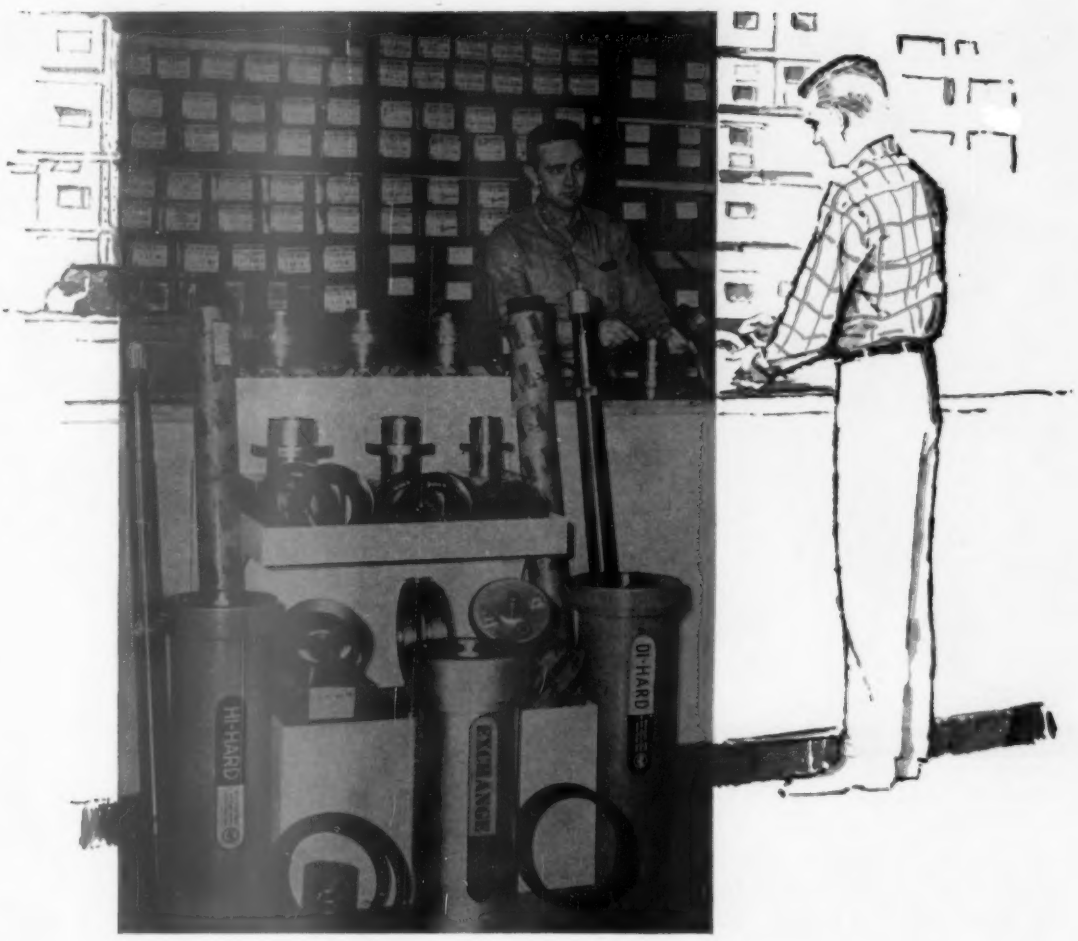

When you need 'em... "Oilwell's" got 'em

–and they'll be the best fluid end parts you can buy anywhere!

Genuine "Oilwell" replacement parts are made to the same high standard of quality and workmanship as you get in the original "Oilwell" pumps.

They are designed and engineered to exacting specifications for your equipment. And each part is carefully packaged in protective containers to assure its being in clean, ready-to-use condition when you put it in your pump.

For the *continued* efficient performance and low-cost operation of your pumps, use only genuine "Oilwell" fluid end replacement parts. Ask for them by name. Genuine "Oilwell" fluid end parts and a wide variety of other maintenance supplies are available at your nearest "Oilwell" store.

USS, "Oilwell", Wilson-Snyder, Di-Hard and Hi-Hard are registered trademarks

They're Genuine "OILWELL" Quality—
your assurance of satisfaction!

DI-HARD Liners give longer service but cost no more.
HI-HARD Liners can be exchanged and rebuilt.
HI-HARD Piston Rods have *hard* surface on high tensile core.
HI-HARD Chrome Piston Rods are extra resistant to corrosion.
"4-on-1" Wilson-Snyder Pistons have the never-wear-out body.
Valves and Seats have more metal-to-metal impact area.
Rod Packing, Liner Packing and Gaskets are made to rigid specifications.

USS **Oil Well Supply Division of United States Steel**

Executive Offices: Dallas, Texas
Export Office: 30 Rockefeller Plaza, New York 20, N.Y.

NEW FROM GASO

Gaso Fig. 3467 — 1¼" to 2" x 4" Horizontal Triplex Plunger Pump with Single-Suction.

CAPACITY, PRESSURE, POWER CHART

Plunger Size	DISPLACEMENT Barrels per Hour 100 RPM	350 RPM*	Maximum Working Pressure P.S.I.	HORSEPOWER REQUIRED at Maximum Speed & P.S.I.
1¼"	9.0	31.5	3500	50
1½"	13.3	46.5	3250	68
1¾"	18.0	63.0	2500	71
2"	23.1	81.0	2000	73

*Maximum RPM of Crankshaft

Fig. 3467, featuring a new high pressure fluid end for use with small size plungers, brings the economies of single suction and the advantages of high pressures to small-volume water flood projects and well servicing operations. The results in terms of performance are shown in the accompanying chart.

Adaptable to Any Service Conditions

Fluid end body may be of aluminum alloy bronze or alloy steel. Suction and discharge valve assembly may be of the stem-guided monel metal disc type, or of Durabla stainless steel. All plunger sizes are available in hardened stainless or specially surfaced steels; ceramic plungers are available in the 1½", 1¾" and 2" sizes only.

Consult Us for Recommendations

Our engineering and sales staffs are always eager to work with you in obtaining maximum pumping results. Why not let them recommend the most effective application of the new Fig. 3467 Triplex Plunger Pump to your needs?

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NEW CHIKSAN SPRING BALANCED LOADING ARM—

Here is a series of loading arms that is built to deliver solid performance right around the calendar. Outstanding new compression spring design offers finger-weight flexibility, yet the arm will not creep or sag when released. Springs are housed in a sturdy weatherproof steel case. Balance adjustments are accomplished with a hand wrench. The swivel joints on the arm have the dependability that has been associated with the name Chiksan for 30 years. Get the facts. Write for Bulletin 1-61.

FEATURING NEW TOTALLY ENCLOSED COMPRESSION SPRING—

Self compensating spring tension provides complete balance at any position. Compact design. No protruding brackets or counterweights.

4 MODELS FOR PETROLEUM SERVICE

Select from a complete line. All models—Folded Arm, Sliding Sleeve (shown above), Bottom Loader and Long Reach are available in 2, 3, and 4-inch sizes. Each model is a complete, ready for service, unit.

2 MODELS FOR CHEMICAL SERVICE

For loading or unloading virtually any chemicals, Chiksan offers a standard group of arms equipped with its DS series swivel joints. Available in Folded Arm model or Sliding Sleeve unit (shown at left).

WANT TO CONVERT EXISTING EQUIPMENT?

Chiksan Base Arm Sections permit operators to change existing facilities with minimum effort. Base Arm Sections are available in standard sizes of 2", 3", and 4". Riser joint supplied with threaded or flanged connections.

MAIL COUPON TODAY FOR COMPLETE INFORMATION

CHIKSAN fmc

#61-60

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330 North Brea Blvd., Brea, Calif.

Please send me your Bulletin 1-61.

Name_____

Title_____

Company_____

Address_____

City_____ Zone_____ State_____

CHIKSAN COMPANY—General Offices: Brea, California • Well Equipment Mfg. Corp. Division (Weco Unions, Hamer Valves) • Chiksan International • Chiksan of Canada Ltd.
Offices and Representatives in Principal Cities of the World

Available now on an industry-wide basis...

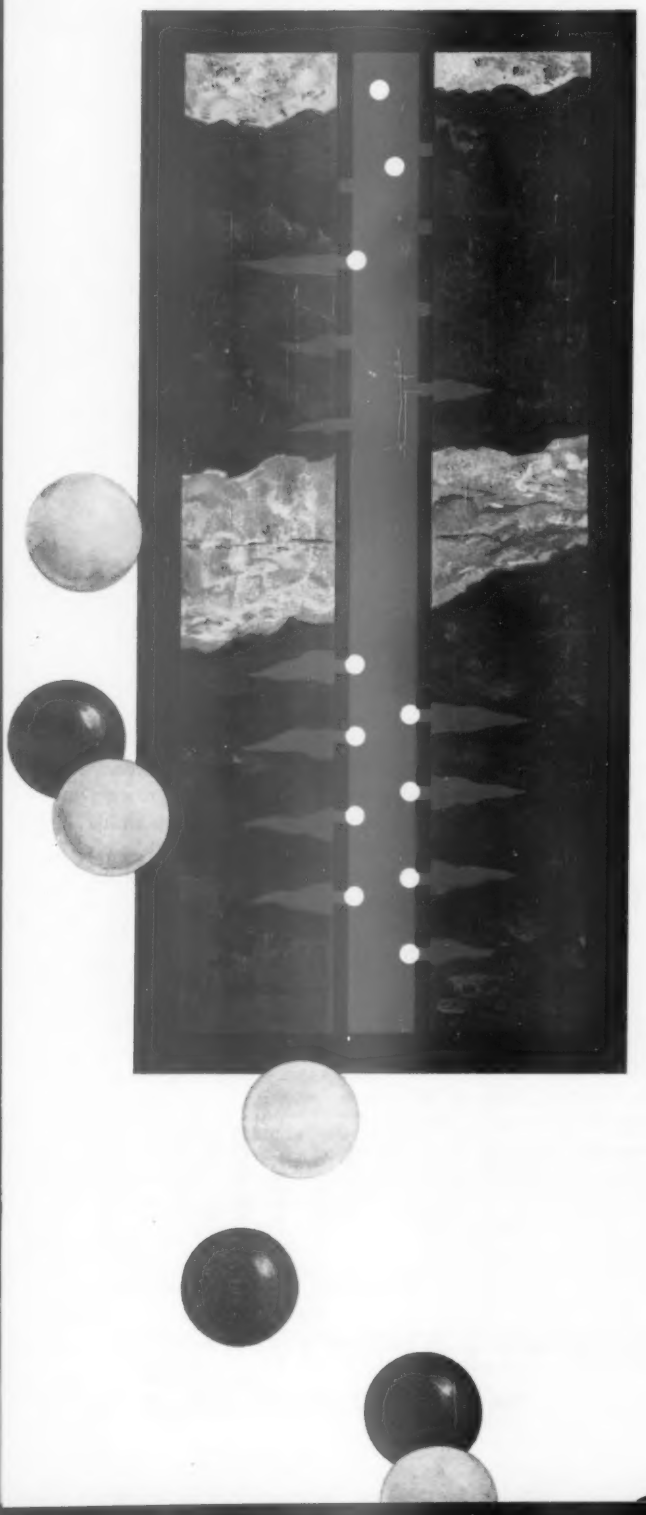
Patented Ball Sealer Process for *One-Stage* Fracturing and Acidizing

of Perforated Pay Zones!

These Ball Sealers help open drainage channels that cannot be penetrated by other methods!

HOW THEY WORK. The Ball Sealers are injected into the fracturing or acidizing fluid at intervals. Reaching the pay zone, the first balls seat on the perforations that are taking the most fluid, diverting the fluid flow to perforations opening on less permeable formations. These formations, in turn, are broken down by the resulting pressure build-up. The process continues until *full* treatment is achieved. When fluid injection stops, the disposable balls – made of nylon, hard rubber or rubber-covered nylon – drop to the bottom of the well.

More effective treating of any zone–regardless of size!



Now the benefits of the patented Ball Sealer process are available to you on an industry-wide basis. Ball Sealers allow *one-stage* treatment of perforated pay zones . . . can save you up to 50 per cent on fracturing and acidizing costs. They can be used with equal effectiveness on multiple sections within a pay zone . . . or on separate production zones in dual completions. Either jet or bullet-perforated casing may be treated—in open casing, down the annulus or through open-end tubing. You're money ahead because Ball Sealers save rig time . . . save multi-stage treatment costs . . . eliminate the cost of bridge plugs and packers. Your service company can give you full details.

Available now through these authorized Service Companies

BJ Service, Inc.
Cardinal Chemical, Inc.
Central Acid Service, Inc.
Halliburton Company
Independent Oil Well Frac Company
Producers Chemical Company
Rig Cementing Co.
Texas Acidizers
The Western Company
West Oil Well Cementing Service

SPECIAL REPORT TO MANAGEMENT

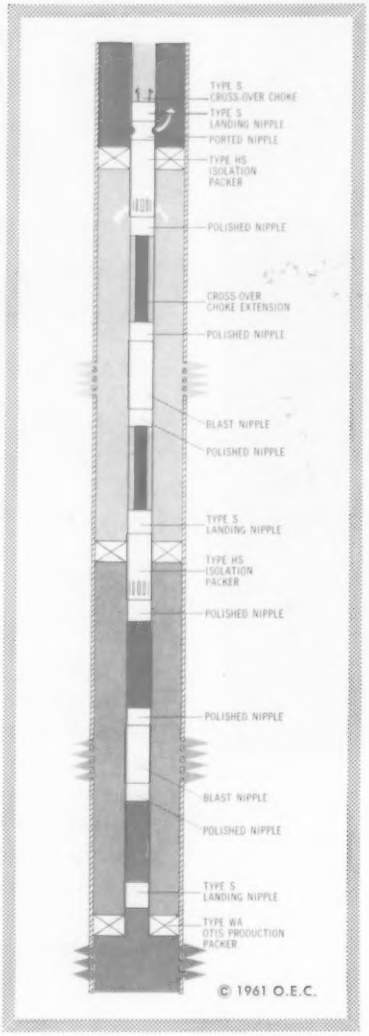
OTIS PRODUCTION NEWS

Volume II, Number 4 **Otis Engineering Corporation • Dallas** *Production Equipment and Services*

Otis Triple Zone Selective Cross-Over Completion Designed to Permit Production of Any Two Zones—Postpone Remedial Work

CORPUS CHRISTI—Operators in this area have found a new Otis Selective Cross-Over Completion ideal for producing new triple zone wells. The completion offers its greatest savings through selectivity of production, and is designed to postpone remedial operations which would entail moving a rig back over the hole. The completion is also designed to be made in standard 5½" casing using 2⅜" tubing to aid in holding downhole equipment costs to a minimum. This new Otis triple zone completion is designed to permit any one of the three zones to be produced individually with the other two blanked off, or two of the three zones to be produced simultaneously, directing the production from either zone through the annulus or the tubing as desired. When producing two of the zones simultaneously, one of the zones must be crossed-over just above the top packer through the use of a standard Otis Concentric Cross-Over Choke.

In addition to the above, this type of cross-over completion offers several other production advantages. The completion technique employed on initial installation is designed to permit each packer to be tested to the breakdown pressure of the zones before the next packer is set. Access to the upper zones is through the ports in the Sliding Side-Door® assembly of the Type HS Otis Retrievable Isolation Packer. Type HS Packers are used to isolate the upper two zones as shown in the accompanying installation diagram. In this installation, by straddling the upper zone with the top two packers, a short extension to the Otis Straight Flow or Cross-Over Choke acts to permit selective production of the middle and lower zones or the middle and upper zones through the tubing or annulus, with the alternate zone blanked off in each case. This also serves to permit chokes to be changed by standard wire line methods without requiring a rig over the hole.



In addition to these advantages, the completion technique is designed to permit any one of the zones to be exposed to the tubing or the casing, or both, with the other two zones blanked off for circulating, treating, and testing. Fracturing treatments on individual zones at pressures up to 4,500 p.s.i. have been performed in wells using this type of completion.

This is another Otis-engineered completion designed to provide the ultimate in economical, versatile, and efficient alternate-zone selective production. For more information on alternate-zone, selective and multiple completions, or for help with any other specific completion problem, call the Otis office nearest you or write Otis, Dept. 4-W, P.O. Box 35206, Dallas 35, Texas. You'll find your Otis Well Completion Specialists ready to help you . . . anxious to serve you.

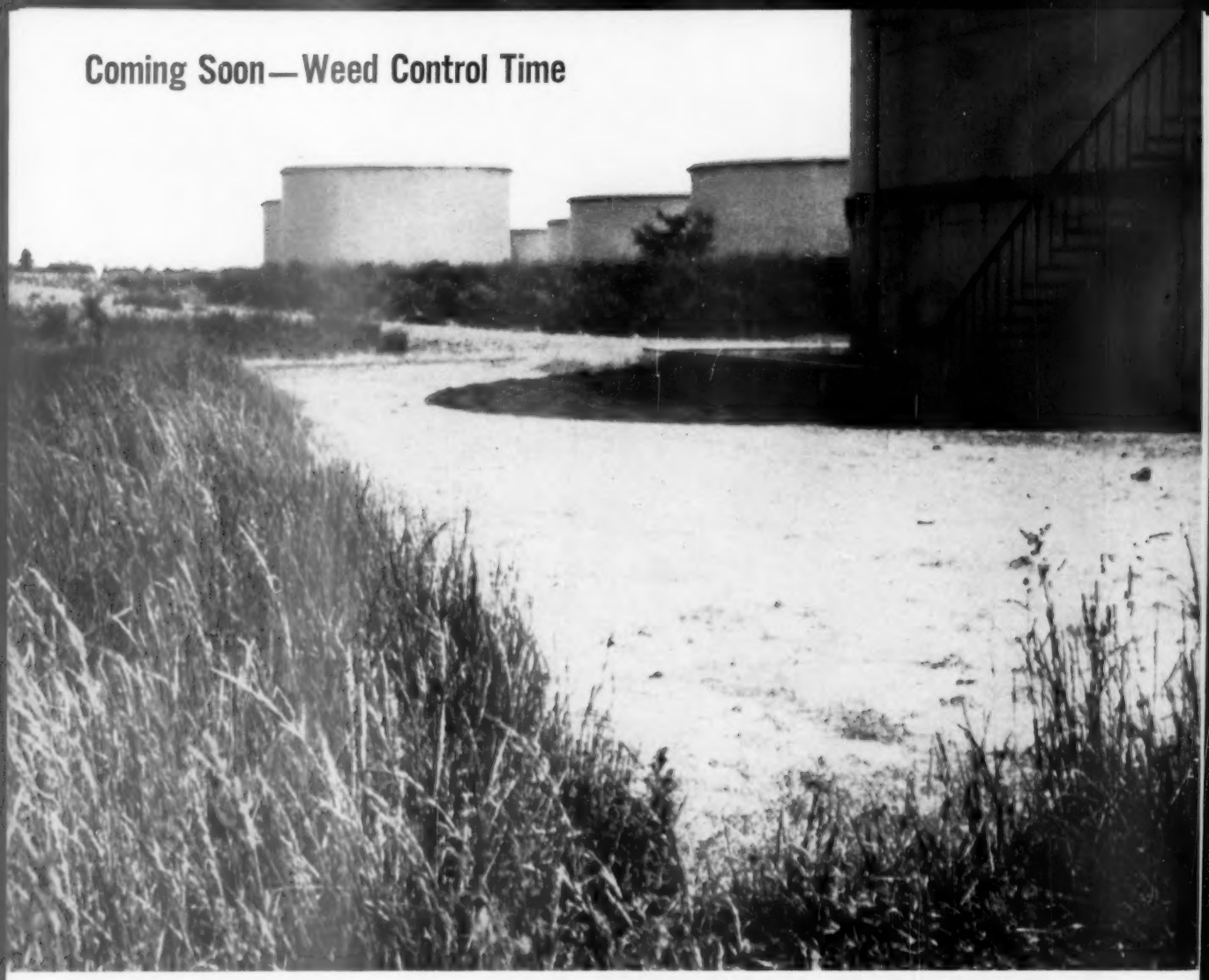
OTIS

Engineering OTIS Corporation

General Offices:

6612 Denton Drive • Dallas, Texas

Coming Soon—Weed Control Time



The Tidewater Oil Company obtained excellent weed control around storage tanks at their Delaware Refinery by spraying Du Pont Karmex® and Du Pont Trysben® 200. The area was sprayed in the fall of '59—the photograph taken early fall of '60.

Spray a Du Pont Weed Killer once—soon—to eliminate the hazard from fire

Best way to control weeds is to prevent them from getting established. Spray key areas with Du Pont Telvar® monuron or "Karmex" diuron weed killer—just once—right at the start of the season. That way, weeds will be killed, as soon as they sprout, by these chemicals which stay in the soil for an extended period of time to kill through the roots. In addition, spraying early gives you an entire season of freedom from the fire hazards and maintenance difficulties caused by weeds around tanks, pipelines and well areas.

Du Pont also has the answer to the problem of deep-rooted perennials with "Trysben" 200 weed killer. This new weed killer controls tough, broad-leaved perennials by acting through both roots and foliage.

All three of these Du Pont Weed Killers are easy and economical to use. They are also non-flammable and low in toxicity to humans and animals.

Why not plan this year's weed control program right now—and spray soon? A new booklet on Du Pont Weed and Brush Killers and free technical assistance is also available. Just mail the coupon.

On all chemicals follow labeling instructions and warnings carefully.

DU PONT WEED KILLERS

REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

E. I. du Pont de Nemours & Co. (Inc.)
Industrial & Biochemicals Department
Room 2543-N, Wilmington 98, Delaware

☐ Please send me your new booklet on Du Pont Weed Killers. ☐ I would like to have assistance in setting up an effective weed control program.

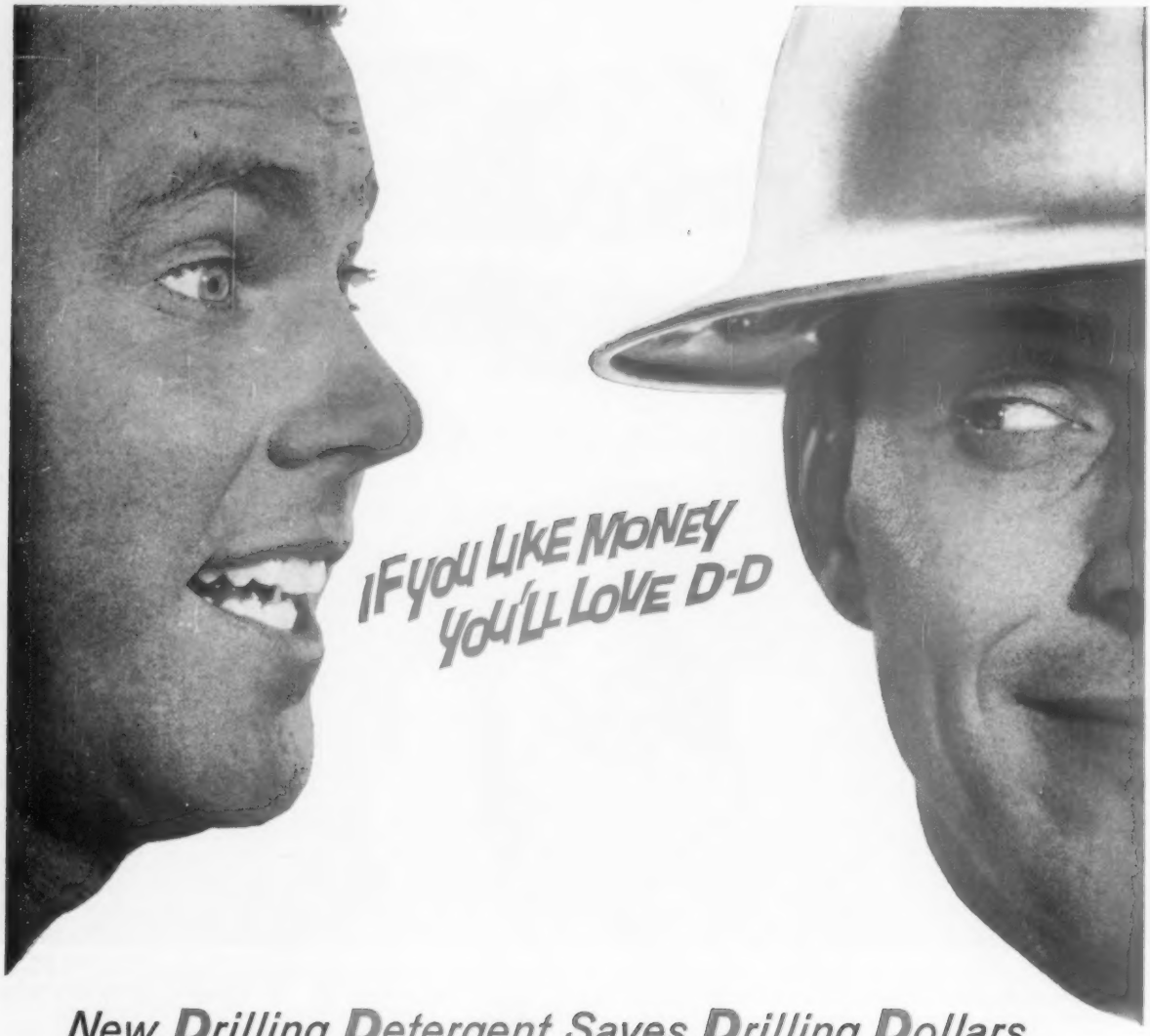
Name_____

Title or Position_____

Firm_____

Address_____

City_____ Zone___ State_____



New Drilling Detergent Saves Drilling Dollars

D-D®, Magcobar's new drilling detergent, is recommended only for operators and contractors who like money. Because, when you use D-D on your well, it's hard **not** to save money.

Look what D-D does. By reducing surface tension in water base muds, it speeds up the rate of penetration. What's more, it settles out sand, extends the use of low pH muds to greater depths, and reduces costs of chemical treatment.

Another **Well Done** with Magcobar Technology

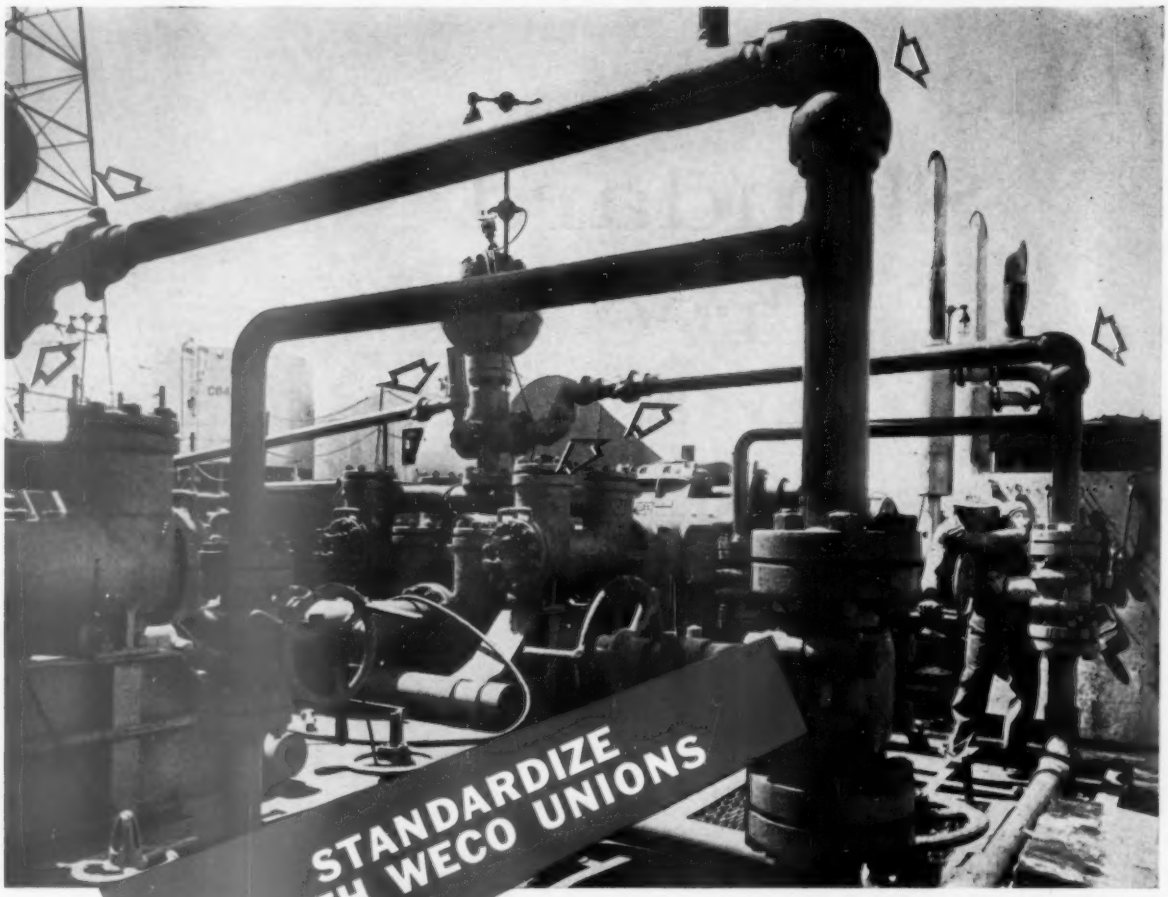
®Registered trademark, Magnet Cove Barium Corporation.

The really big surprise about D-D is that so little does so much. Initial treatment is only ten gallons per 500 barrels of drilling fluid. Maintenance is two to six gallons per tour.

Like money? You can learn all about D-D by writing for the new brochure. Magnet Cove Barium Corp., P. O. Box 6504, Houston, Texas.

Magcobar
Complete
DRILLING MUD SERVICE

DRESSER INDUSTRIES, INC.
OIL • GAS
CHEMICAL
ELECTRONIC
INDUSTRIAL

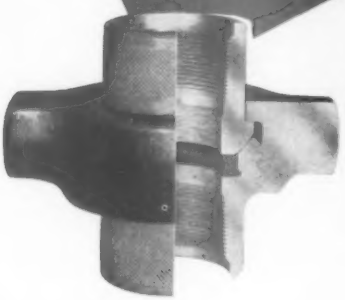


the key to new economy and efficiency in rigging up

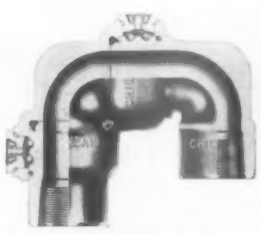
Operators report that standardizing with WECO Unions has cut many hours off rig-up and tear-down time . . . has simplified piping make-up . . . eliminated leaks and streamlined rig efficiency.

A big plus value of Standardizing with WECO Unions is the ability to switch equipment from one rig to another without changing piping or connections. WECO Unions are perfectly interchangeable in the same size and pressure rating. The heavy wing nut, the strong acme threads, the famous ball and cone seat resist the roughest, toughest oil field service on well after well.

WECO Unions, in sizes and pressure ratings for every oil field service, are available at Supply Stores everywhere. For further economy, combine WECO Unions with their companions Chiksan Swivel Joints for lower cost and greater flexibility in your discharge hoses.



WECO FIG. 602 UNION
6000 psi test
Sizes: 1" through 4"



CHIKSAN SWIVEL JOINT
Style 50 6000 psi test
Sizes: ⅜" through 4"

WECO® WELL EQUIPMENT MFG. CORP.
HOUSTON, TEXAS
Division of CHIKSAN COMPANY *a subsidiary of* FOOD MACHINERY AND CHEMICAL CORPORATION

U-1-61

fmc®

WECO UNIONS

CHIKSAN SWIVEL JOINTS

HAMER LINE BLIND VALVES

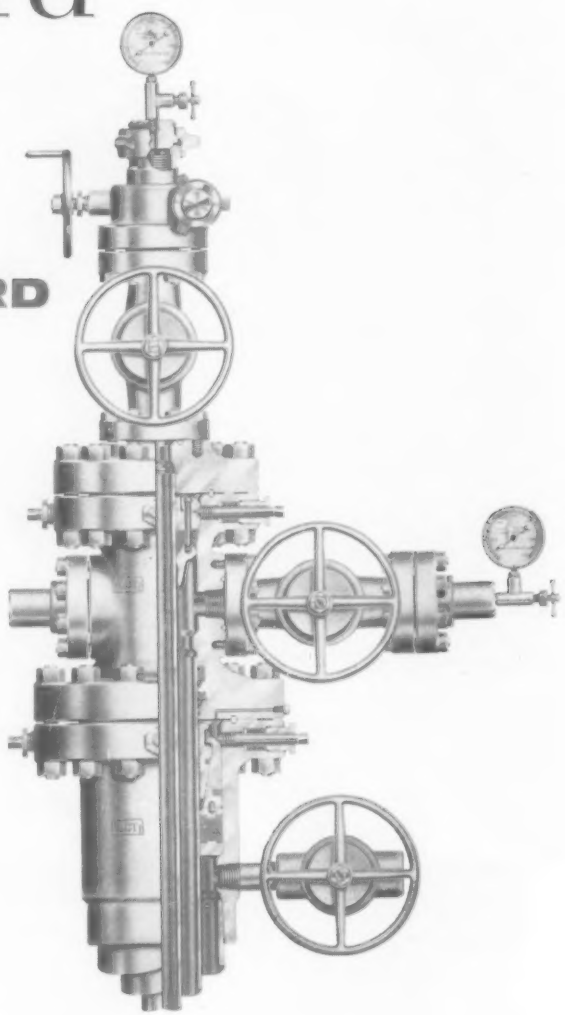
HAMER PLUG VALVES

WECO AIR-O-UNION

WECO COMPOUNDS

WECO SNATCH BLOCKS

The O·C·T Standard Tree



STILL THE "STANDARD OF THE OILFIELD"

The O-C-T Standard Tree is a combination of an O-C-T casing head, O-C-T tubing head, master valve of your choice, and an O-C-T flow control.

Thousands of O-C-T Standard Trees are performing in oilfields around the world. The strength, simplicity, and flexibility of the Standard Tree made it the "standard of the oilfield" years ago.

Constant improvements to the O-C-T Standard Tree have made a good tree better. Today, more than ever, informed buyers can say, "There is no better hookup."

where progress is a daily practice

O·C·T

OIL CENTER TOOL CO.

SUBSIDIARY OF FOOD MACHINERY AND CHEMICAL CORPORATION

Address Export Inquiries for All Countries to
P. O. Box 3091, Houston, Texas.

Memo to Management:

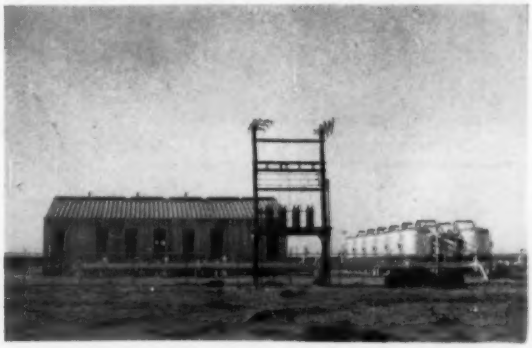
. . . YOU GET THESE
SAVINGS
AUTOMATICALLY
with Utility Electric Power

Utility electric power is highly efficient in modern automatic operations and brings with it worthwhile savings in money, manpower and time. Furthermore utility electric power is adaptable, flexible . . . providing high-continuity of service around the clock, when and where you need it. Call your utility electric power company for details.

PETROLEUM POWER ELECTRIC ASSOCIATION

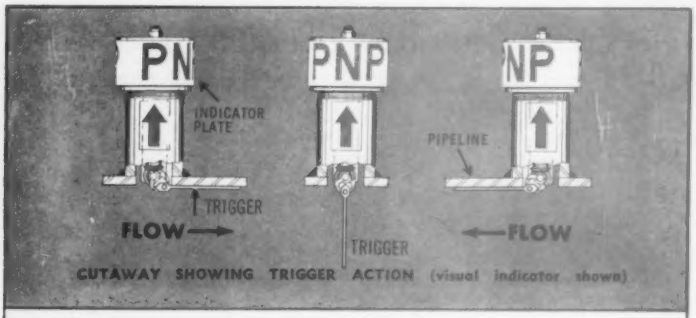
BOX 35006, DALLAS 35, TEXAS

A list of P.E.P.A. members will be furnished on request.



NEWS FROM DOWN THE LINE!

Successful PIG-SIG II
now has NEW BI-DIRECTIONAL TRIGGER
Plus Other Optional Features



CUTAWAY SHOWING TRIGGER ACTION (visual indicator shown)

• The WmSon PIG-SIG II Scraper Passage Indicator which has earned such wide acceptance in the pipeline industry is now available with bi-directional trigger as an optional feature. The trigger is designed for use in lines where scraper travel may be in either direction and in meter proving loops. Other optional features: pneumatic control with automatic reset and automatic counter to record scraper passage.

PIG-SIG II PATENT PENDING

Long trigger action detects scrapers even in oversize pipe

In the top example, PIG-SIG II with visual indicator shows the station operator the pig has arrived. He doesn't need to wait and listen at the scraper trap. The next example shows how PIG-SIG II with electric indicator can signal arrival of pig to pump station operator. It can start operation of automatic equipment to open and close valves. PIG-SIG II is easily installed under pressure with WmSon-Hillco Tapping Machines. It is available with visual indicator and manual reset; electrical or pneumatic signal with automatic reset; extended or regular.

FOR ADDITIONAL INFORMATION
WRITE DEPT. A FOR BULLETIN A-199-A

T.D. Williamson, Inc.
P. O. BOX 40 • TULSA 2, OKLAHOMA
REPRESENTATIVES AROUND THE WORLD

PIG-SIG II can be used to actuate pneumatic and electric control systems. WmSon engineers may be able to offer dollar saving tips on its use in such systems. **Contact your representative or the Tulsa office.**

Edward Mudwonder Valves help us drill 'em deeper, cheaper. . ."

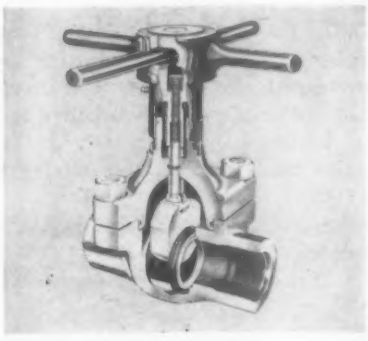
SAYS AL FIELDEN,
TOOLPUSHER,
LLANO DRILLING CO., RIG #5
MIDLAND, TEXAS

"Living up to our motto of drilling wells deeper and cheaper," continues Mr. Fielden, "means we've got to be on our toes in every part of the operation. Equipment selection is a good example.

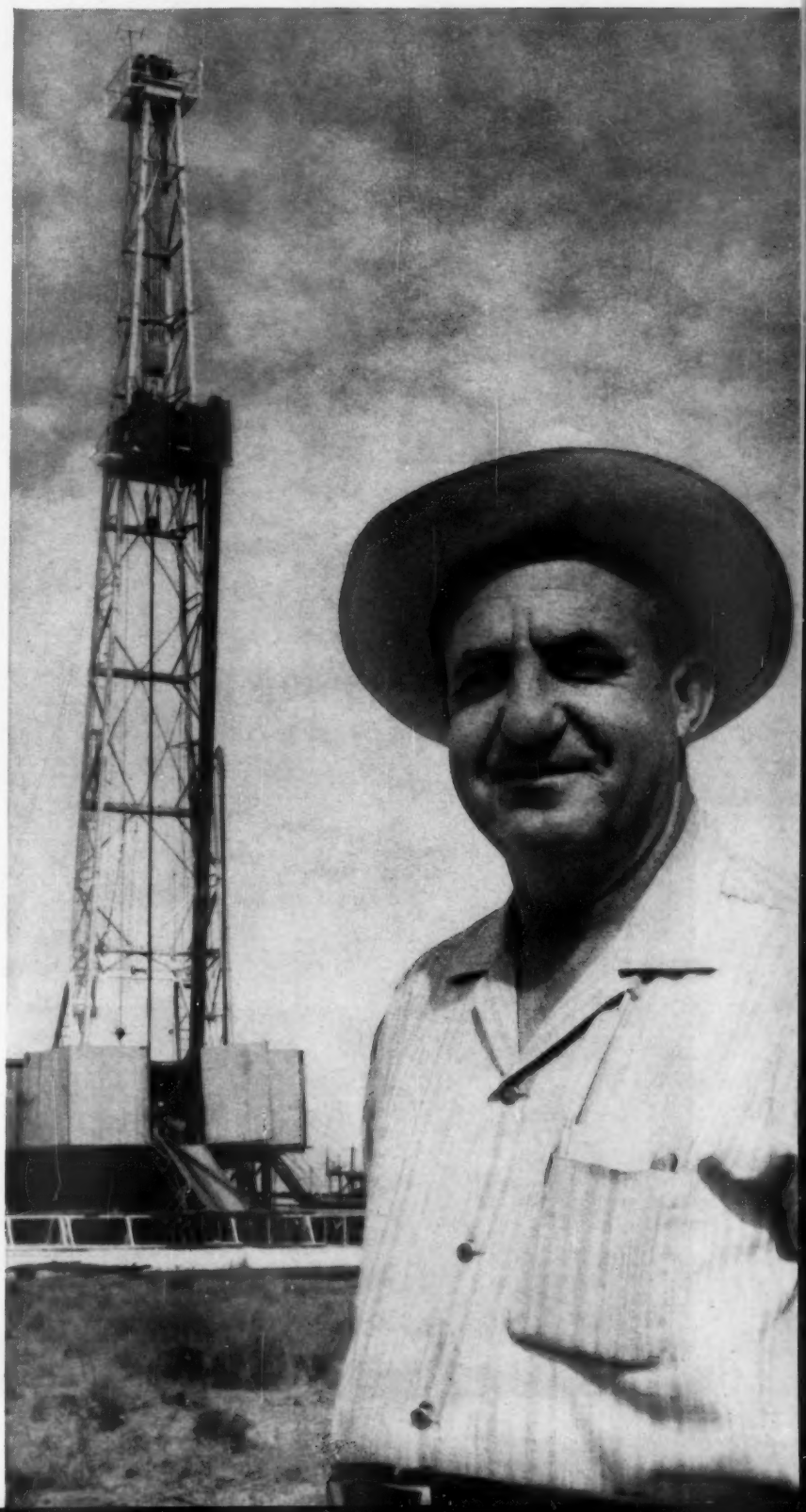
"If a piece of rig equipment is too expensive to operate or maintain, we get rid of it—fast. So many unpredictable things can happen in the hole itself that we just can't take additional risks with undependable equipment above ground.

"In the case of mud valves, we settled on Edward Mudwonders about three years ago. We found that they were reliable, easy to operate, and needed practically no servicing. When our other mud valves wear out, we replace them with Mudwonders."

Edward Mudwonder Valves are built in 2", 3", and 4" sizes, with screwed or flanged ends, for 2000 psi WP (4000 psi test), 3000 psi WP (6000 psi test), and 5000 psi WP (10,000 psi test) service. See your favorite oil field supply store, or write Edward Valves, Inc., 1212 W. 145th Street, East Chicago, Indiana. Subsidiary of Rockwell Manufacturing Company. 6021



EDWARD STEEL VALVES
another fine product by
ROCKWELL



Official NADA records* prove

CHEVY'S HIGH TRADE-IN CAN HELP CUT YOUR FLEET COSTS!

Besides Chevrolet's low initial price and low operating cost, you can count on still another big saving at trade-in time. And you don't have to take our word for it. Check the official National Automobile Dealers Association records for yourself and see how Chevies *consistently* bring higher trade-in return than any other car in their field. Why? Because more people want Chevrolets than any other car. It's this greater demand (on both the new and used car markets) that keeps Chevy's resale value *up* to help keep your fleet costs *down*. And while you're at it, check your dealer on all the people-pleasing improvements in the new Chevrolets that not only make them better cars for business—but a better bet for higher trade-in in the years to come. ... Chevrolet Division of General Motors, Detroit 2, Michigan.

CHEVROLET

*Based on prices in the National Automobile Dealers Association 1961 USED CAR GUIDE, recent-model Chevrolets are now bringing a higher percentage of their original price than any other full-sized car in their field.

National Supply has everything you need for Spring Clean-Up

You'll find it pays to use your National Supply store as a single source for all your Spring clean-up needs. With one order you can cover all your needs . . . paint, hose, water cans, rig wash, paper towels, rakes, brooms, brushes, etc.

You'll save time by eliminating the need for visits or calls to several suppliers. One-order delivery will simplify your inventory control. And you'll be pleased with the wide variety of products and famous name brands you'll find at National Supply. We stock over 65,000 products, each made by a leading manufacturer with an established reputation for quality and reliability. All products are carefully selected with your needs in mind.

There are 119 of these National Supply stores strategically located to serve you as efficiently as possible. Next time you buy, see National Supply.

Why National units are today's

This is a National Supply pumping unit installed in West Texas. National pumpers are available in 13 basic sizes, with 148 standard specifications. Your National Supply representative can recommend a unit to meet your exact needs.

best pumper investment

LOW COST OPERATION. All features and parts of National pumpers are designed to give you low cost installation and operation. For example, National Supply provides frictionless bearings that measurably reduce fuel consumption. Ask your National Supply representative to show you how these frictionless bearings will save you money.

SPECIAL DESIGN FEATURES... at no extra cost. You get many "extra" features in National pumpers without paying premium prices. The entire National line is competitively priced. Here are a few of the features that are standard in National pumpers:

Accurate Counterbalancing. Geometric and concentric design of cranks and counterweights allow accurate counterbalance, at a leading or lagging condition as well as at mid-stroke. Counterweights can be quickly and safely adjusted by one man.

Two-Direction Gear Reducers. National gear reducers can be rotated in either direction, permitting more latitude on prime mover placement. This extends the life of the reduction unit.

Arc Hanger Design. Arc hanger has a hinge that can be folded back for unhindered well servicing. Self-adjusting features prevent side loading, polished rod bending and excessive wear of stuffing box packing.

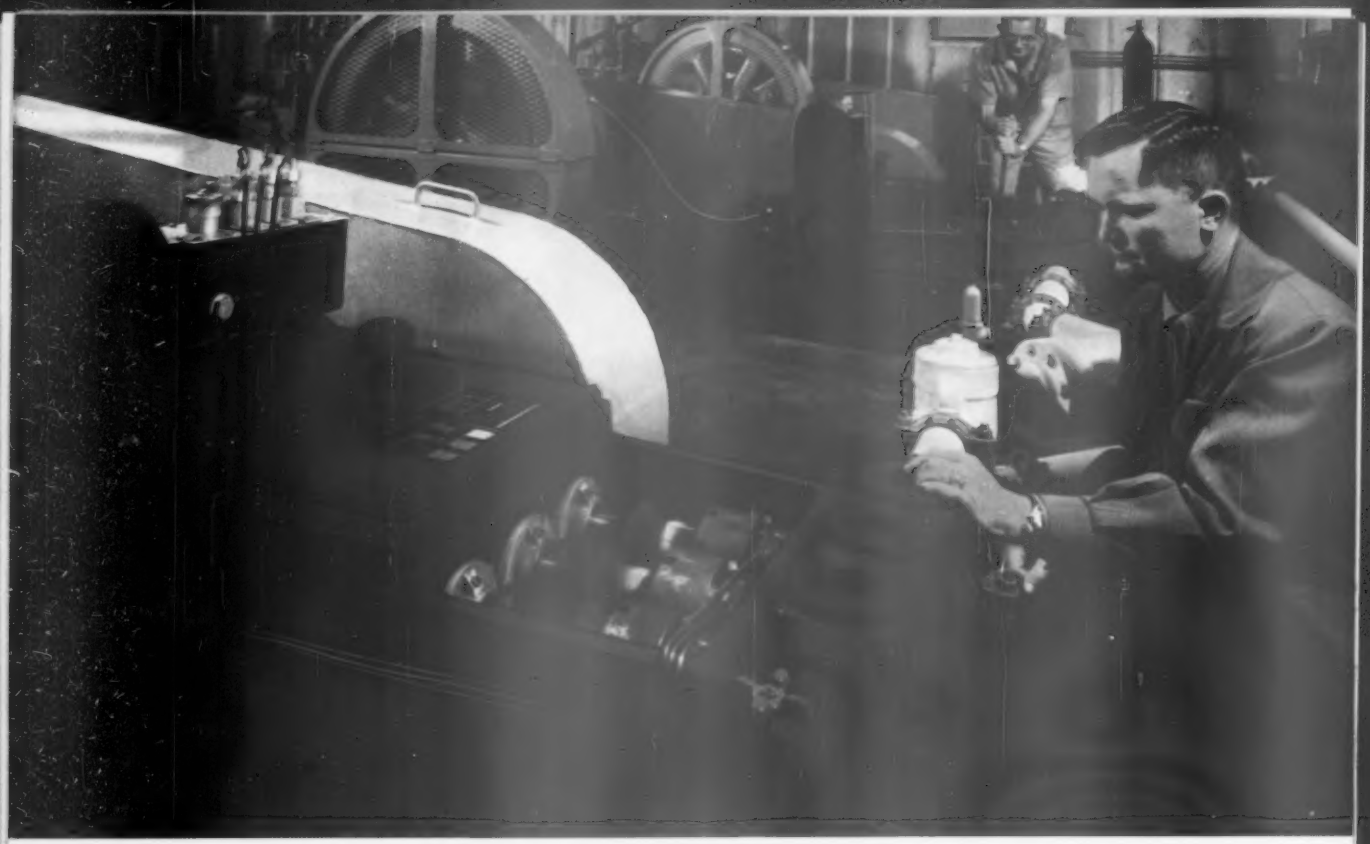
Dust Seals. National pumpers have dust excluders on all bearings to improve the life of oil seals and bearings. Dust seals on shafts rotate with, but do not touch, the shafts.

Unmatched Stability. National pumpers are less susceptible to twisting or stressing because of wide spacing of the samson post's four legs and cross bracing. Design distributes beam load evenly over entire foundation area.

National pumping units are available in 13 basic sizes with 148 standard specifications in beam and crank counterweighted types. They are structurally rated from 2,065 to 32,400 pounds on the walking beam. With this variation, there is never need to compromise on pumper size or rating. Ask your National Supply representative to recommend the ideal pumping unit to meet your specific requirements. Or write today for complete information from National Supply Division, Armco Steel Corporation, Two Gateway Center, Pittsburgh 22, Pa.

Steel's Symbol of strength, long life, and economy

Steel



The J-50 triplex pump has an integral suction pulsation dampener extending the full length of the fluid end, directly below the suction valves for maximum efficiency.

NEW NATIONAL J-50 TRIPLEX PUMP

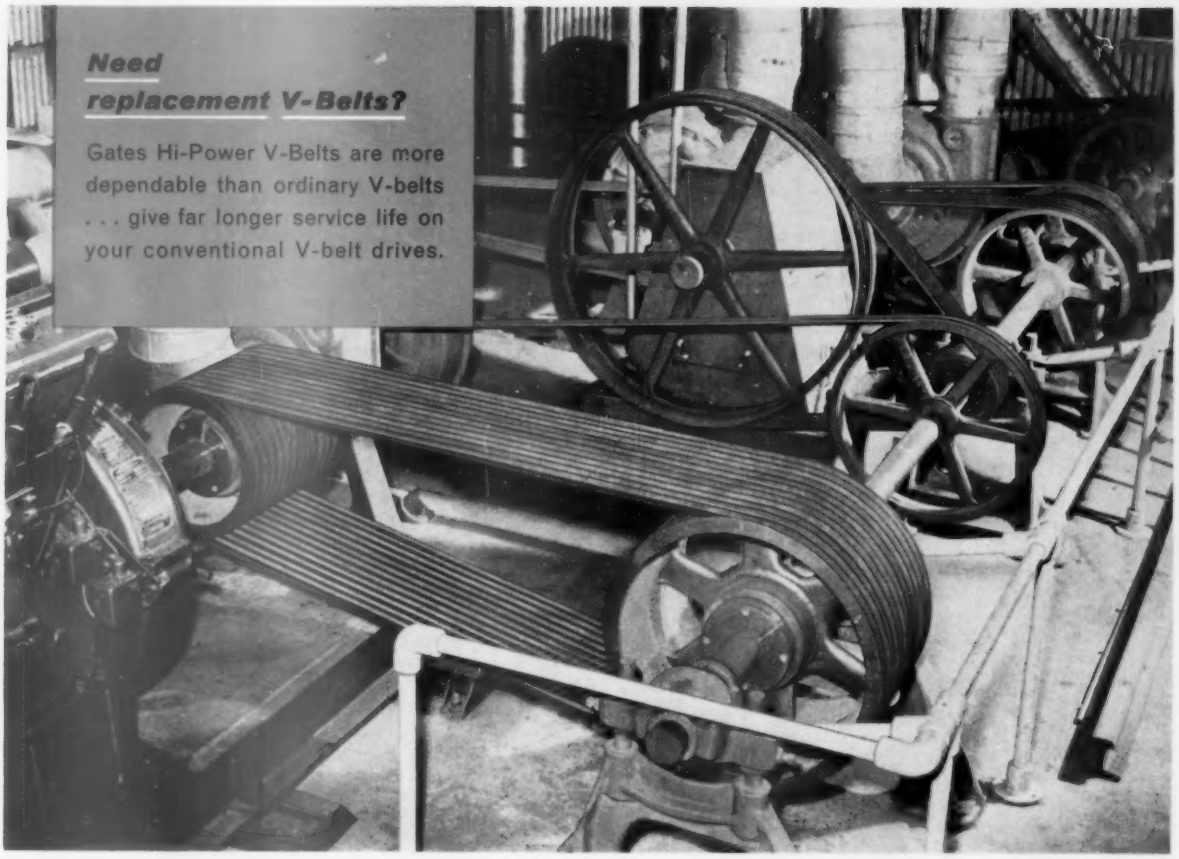
for water flooding, power oil service and salt water disposal

The new National horizontal triplex pump is rated at 50 input horsepower for many applications such as water flooding, salt water disposal and power oil service.

You get low initial cost, plus a proven ruggedness and smooth operation with the J-50 triplex pump. Some of the many features are the built-in suction dampener, lightweight aluminum alloy connecting rods, and double extension crankshaft. A special fluid end can be specified for power oil service.

The J-50 triplex is available in three models: the J-50L and J-50M for low and medium pressures in corrosive and noncorrosive service, and the J-50PO for power oil service. Write for free literature on this versatile new pump to National Supply Division, Armco Steel Corporation, Two Gateway Center, Pittsburgh 22, Pa.

ARMCO National Supply Division


Need
replacement V-Belts?
Gates Hi-Power V-Belts are more dependable than ordinary V-belts . . . give far longer service life on your conventional V-belt drives.

Why Gates Hi-Power V-Belts are industry's No. 1 choice for replacement belts

There are several important reasons why Gates Hi-Power V-Belts are preferred by most industrial V-belt users today.

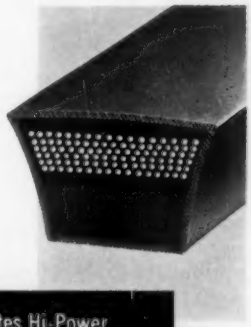
The exclusive construction features of Gates Hi-Power V-Belts—Concave Sides (U.S. Pat. No. 1813698), Precisely-Engineered Arched Top, Flex-Bonded Tensile Member—make them more dependable than ordinary, conventional V-belts, giving you far longer belt life on even the toughest applications.

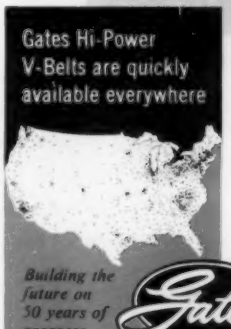
Moreover, because of Gates high standards of quality control, you get a perfectly matched set of Hi-Power V-Belts every time—every belt pulls its share of the load throughout the long service of the drive, further increasing belt life.

You get fast delivery from local stocks.

Oil field supply houses with stocks of Gates Hi-Power and Rib-Top V-Belts are located in all parts of the oil country, backed by Gates Service Centers in every major oil production area. This means that you can get replacement V-belts quickly.

The Gates-stocked supply house near you is a dependable source for most of your maintenance needs. Call them day or night for fast delivery of Gates V-Belts.





The Gates Rubber Company, Denver, Colorado BP40P

Gates Hi-Power V-Belts

PRETTY CRUDE

There've been a lot of wells drilled that wouldn't even produce one jar of crude . . . maybe half the ocean, but not oil. On the other hand, when you do get a producer, that oil sure is pretty!

When you get to the point where you really want to know what's down there, the surest way to find out is with a Johnston Drill Stem Test. Cost? The average Drill Stem Test on an 8,000-ft. well runs about $400. Pretty inexpensive! Equipment? Fast, accurate and tough! One example is the Johnston packers which have breezed through hydrostatic pressures up to 23,000 psi and over 400° temperature with no sweat. We don't know the word "failure," either.

Whatever you've got — oil, gas, water — you'll know every time with a Johnston Drill Stem Test. Nothing crude about the way those Johnston testers operate — ever! They'll test any hole faster and better, and cut your costs, every time! Think about it! Then call us.

JOHNSTON TESTERS

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WAGNER®
MOTORS
AT
WORK

power to pump petroleum

Special Wagner® oil well motors consume fewer kilowatts per barrel pumped

Positively. Yet they cost less to buy. For Wagner® DP-6 motors are engineered specifically for oil well pumping. They have electrical characteristics that permit "close motoring." Their high torque assures positive breakaway and acceleration for walking beam sucker-rod drives in any climate. Their high slip lets them slow down at peak load so the flywheel of the pump can deliver part of its stored energy to the load. As a result, these motors do consume fewer kilowatts per barrel pumped without sacrificing efficiency and dependability.

Particularly recommended for use in automatically controlled leases, Wagner DP-6 motors are built in 6-pole ratings of 3 through 75 hp. They are compact and drip-proof . . . protected against rain, sand, sleet and snow. Their rugged cast-iron frames and endplates bar corrosion . . . conduit boxes are moisture-proof and dust-tight. Ventilating openings are screened to keep out animals and wind-blown debris. Your Wagner Sales Engineer can show you how these motors, and specially designed pole type matching service transformers can provide even greater economies for your installations. Write for Bulletin MU-243 for full information.

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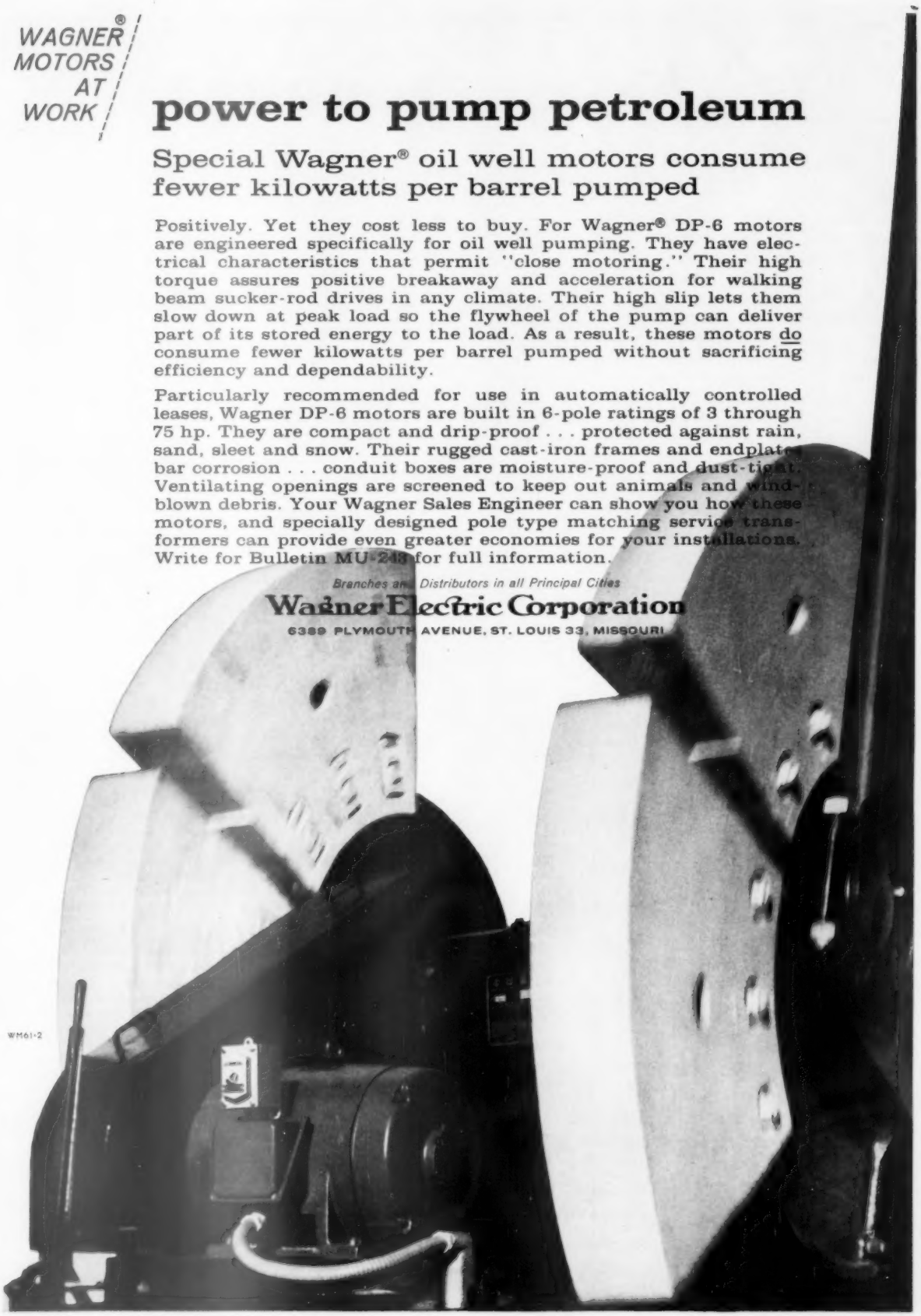

WM61-2

They Say—

They're not joining

Dear Sir:

In your March 13 issue you did a write-up of the Normanna case, being Atlantic Refining Co. vs. Railroad Commission (OGJ, Mar. 13, "Ruling May Doom Small-Tract Drilling in Texas," p. 100) in which Bright & Schiff was one of the appellees.

In that article you made mention of a certain new organization being formed by a Mr. Stanley Woods of Houston. Mr. Woods indicated that Bright & Schiff was involved in the organization.

We represent Bright & Schiff. Bright & Schiff has filed a motion for rehearing in the case before the Supreme Court. We feel that the Supreme Court did not follow established court precedents in this state. We feel also that the Supreme Court did not pass upon many important points that have been raised by Bright & Schiff.

Consequently, it would be premature for Bright & Schiff to engage in any type of activity which would seek to reflect upon an opinion which is not yet final.

This is to advise that Bright & Schiff did not become a member in any new organization of oil and gas lessees or royalty owners, either formed by Mr. Woods or by anyone else. They have no intention of so doing at this time.

Robert B. Payne
Strasburger, Price, Kelton, Miller & Martin
Attorneys and Counselors
Dallas

Reporting in depth

Dear Sir:

Starting with the cover and continuing through all 14 pages the Alberta-California story (OGJ, Mar. 13, "Special Report on Alberta-California Gas Pipeline System," p. 109) is one of the most perceptive and comprehensive features in recent publication annals.

We surely want to congratulate you on a great reporting job for

the OIL AND GAS JOURNAL

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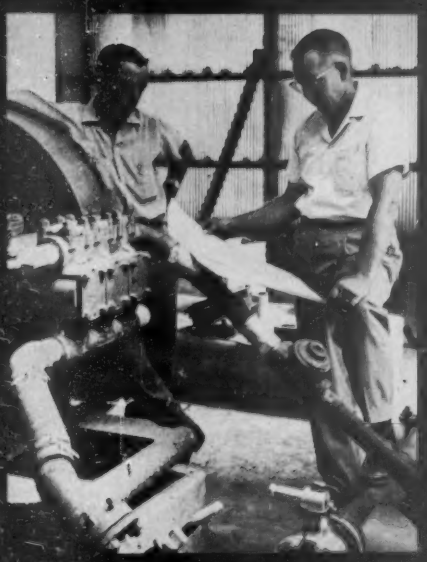
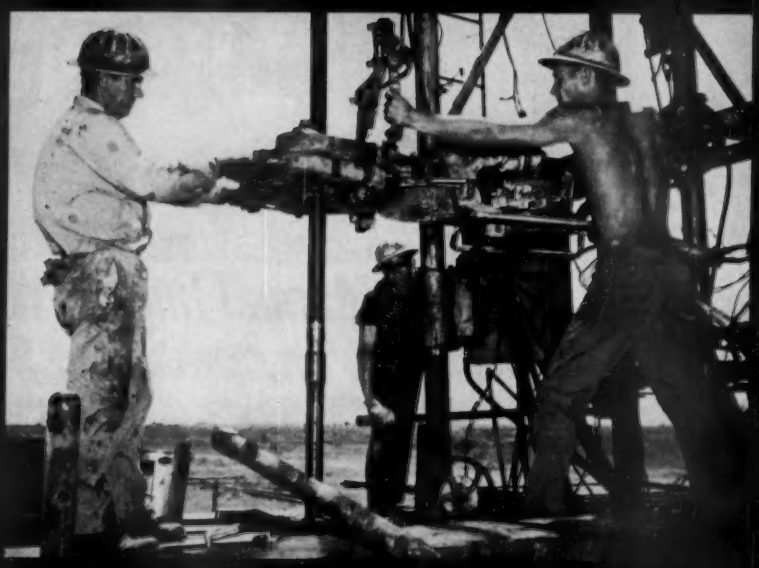


JL SUPPLY

Production kinks and



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Robert L. Ingram
Manager of Public Relations
Bechtel Corp.

Dear Sir:

Congratulations on your March 13 issue and the "Natural-Gas Pipeline Report," especially the Alberta-California system article.

Vincent E. Butler
Vice President
Williams Brothers

Proper perspective

Dear Sir:

Thanks for your "Natural-Gas Pipeline Report" in the March 13 issue (p. 109). It takes a publication of your scope to bring the story to those of us who are so close to the job that we can't enjoy the benefit of proper perspective.

The issue goes on my reference shelf and I am sure I will find occasion to use it often in the future.

Gene Drossel
Kaiser Steel Corp.
Oakland, Calif.

Survey will be helpful

Dear Sir:

It is gratifying to learn of the progress which the refining industries are continuing to demonstrate in the control of air pollution (OGJ, Feb. 20, "Survey on How Refiners Are Combating Pollution," p. 105).

The information you have provided will be helpful in the activities of this department related to air pollution matters.

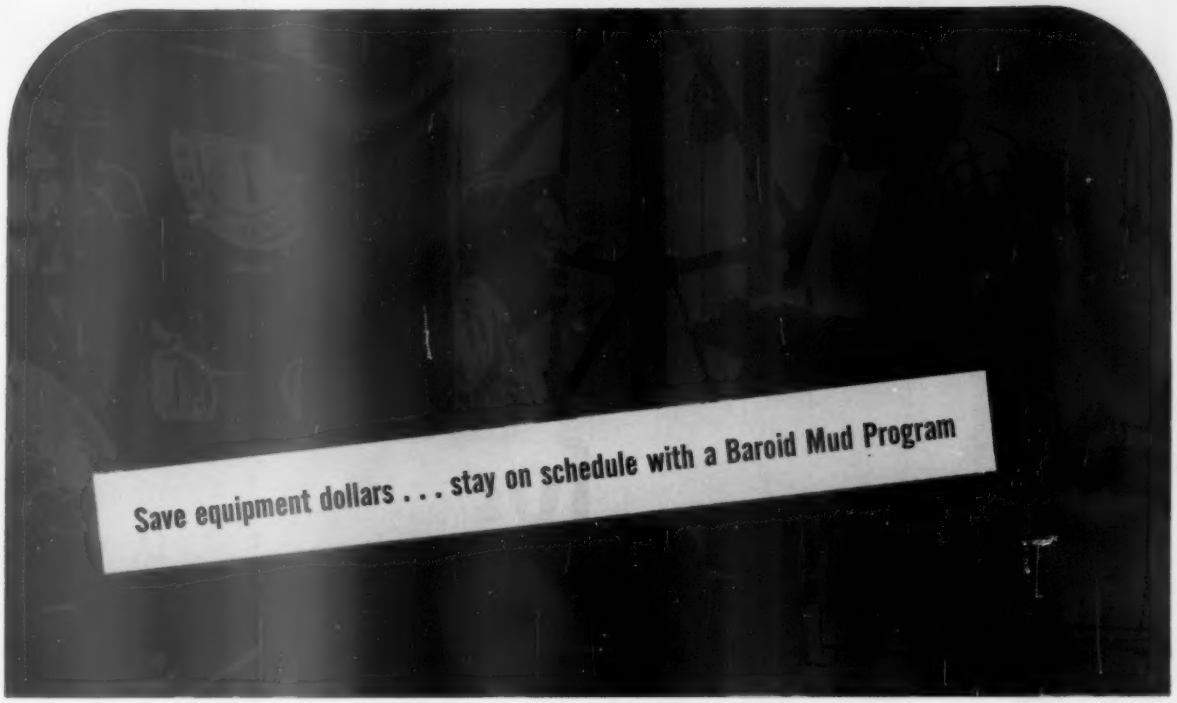
C. W. Klassen
Chief Sanitary Engineer
Illinois Department of Public Health

Constructive thinking

Dear Sir:

Peter B. Bike is to be commended for the presentation of his article "Lithofacies Maps May Help Pinpoint Oil Areas" (OGJ, Mar. 6, p. 184).

The type of thinking evidenced in this article is, without a doubt, the most constructive means for stimulation of interest and activity on the part of not only the major exploration-minded companies but



Baroid Field Report: Cass County, Texas

X-COR* solves drill pipe corrosion problem

Baroid's new film-forming corrosion inhibitor X-COR was proved again by successfully controlling drill-stem corrosion caused by hydrogen sulfide gas from the Smackover Lime formation in Cass County, Texas.

The Smackover Lime is an oil productive zone, but its corrosive sulfides severely attack drill pipe. In Cass County, pilot tests warned when the Smackover Lime formation was being entered at 11,000 feet. A slug treatment of only 2 lb/bbl X-COR was added through the pump suction and drilling proceeded to total depth of 11,200'. The flow properties of the drilling fluid remained unchanged, and the drill pipe came out of the hole free from attack by corrosion.

X-COR produces a tenacious waterproof film that protects down-hole equipment and seals the hole wall and cuttings against hydration, especially important in drilling shale formations. X-COR also serves effectively in packer fluids to ward off corrosion by fluids left in the casing/tubing annulus. X-COR inhibits corrosion caused by hydrogen sulfide gas, oxidation and electrolytes. Easy and safe to use, X-COR does not fluoresce, does not significantly change mud properties and is compatible with all commonly used water-base mud systems.

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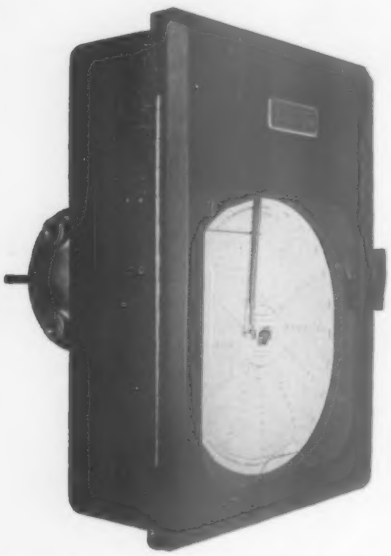

Absolute dependability, under the most demanding operating environments—that's the promise and the performance of the Barton 202A flow recorder. Thoroughly proven in the gas production fields, the 202A is enjoying ever-increasing popularity in gas transmission and distribution systems. It is compact and ruggedly built, not subject to the usual frailties of such a precise instrument; it has built-in overrange protection, and it is immune to condensate problems, making it ideal for application in all geographical areas. A recently added bonus: the 202A can be fitted with the new Barton chart changer which allows the instrument to record continuously and unattended, for up to 16 days, using a fresh chart each day. For complete information and specifications on the 202A flow recorder, request Bulletin 202A-1.

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Richard W. Harding
Geologic Consultant
State College, Pa.

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The Hague
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Letters to They Say should be addressed to The Editor, The Oil and Gas Journal, Box 1260, Tulsa, Okla.

CALENDAR

APRIL

9-11 Society of Exploration Geophysicists, fourteenth annual midwestern exploration meeting, Skirvin Tower Hotel, Oklahoma City.

10-11 American Society of Mechanical Engineers, maintenance and plant engineering conference, Bancroft Hotel, Worcester, Mass.

10-12 Western Petroleum Refiners Association, annual meeting, Granada Hotel, San Antonio, Tex.

10-13 American Society of Mechanical Engineers, oil and gas power conference and exhibit, Jung Hotel, New Orleans.

11-13 Petroleum Industry Electrical Association and Petroleum Electric Supply Association, annual conference, Moody Convention Center, Galveston, Tex.

12 Independent Oil Producers and Land Owners Association Tri-State, and Independent Petroleum Association of America, joint meeting, McCurdy Hotel, Evansville, Ind.

12-14 Investment Bankers Association of America, annual convention of the Texas group, Shamrock Hilton Hotel, Houston.

14 American Institute of Chemical Engineers, St. Louis section, third annual symposium, Coronado Hotel, St. Louis.

14-15 Tulsa Geological Society, Fort Smith Geological Society, joint field trip to the Arkoma basin, registration, Goldman Hotel, Fort Smith.

17-19 Instrument Society of America, symposium on instrumental methods of analysis, Shamrock-Hilton Hotel, Houston.

18-20 University of Oklahoma, southwestern gas measurement short course, North Campus, University of Oklahoma, Norman.

19-20 University of Tulsa, fifteenth annual

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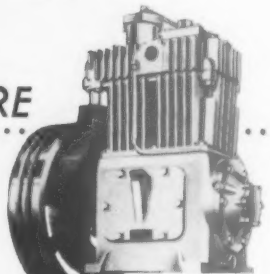

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conference of accountants, University campus, Tulsa.

19-20 National Petroleum Association, semi-annual meeting, Hotel Sheraton-Cleveland, Cleveland.

20-21 Society of Petroleum Engineers of AIME, East Texas-Louisiana-Arkansas gas-technology symposium, Tyler, Tex.

20-21 Texas Technological College, annual West Texas oil lifting short course, Lubbock, Tex.

20-22 Illinois Society of Professional Engineers, annual convention, Peoria, Ill.

24-26 Southern Gas Association, meeting, New Orleans.

24-27 American Association of Petroleum Geologists, Society of Economic Paleontologists, and Rocky Mountain section of AAPG, annual meeting, Denver Hilton Hotel, Denver.

26-28 American Petroleum Institute, Division of Transportation, pipeline conference, Chase-Park Plaza Hotel, St. Louis.

27-28 Rocky Mountain Oil and Gas Association, midyear meeting, Northern Hotel, Billings, Mont.

28 Natural Gasoline Association of America, Oklahoma regional meeting, Lake Murray Lodge, Ardmore, Okla.

29 American Institute of Chemical Engineers, Oklahoma state meeting, University of Tulsa, Tulsa.

30-May 2 Independent Petroleum Association of America, midyear meeting, Roosevelt Hotel, New Orleans.

30-May 3 Liquefied Petroleum Gas Association, convention and trade show, Conrad Hilton Hotel, Chicago.

MAY

2-4 Purdue University, School of Civil Engineering, sixteenth industrial-waste conference, Purdue Memorial Center, Lafayette, La.

3-5 American Petroleum Institute, Division of Production, Rocky Mountain district meeting, Gladstone, Henning, and Townsend hotels, Casper, Wyo.

4-5 Society of Petroleum Engineers of AIME, oil recovery conference, Midland, Tex.

4-5 Pacific Coast Gas Association, Inc., transmission conference, Biltmore Hotel, Santa Barbara, Calif.

4-5 Illinois State Geological Survey, Illinois Basin chapter of AIME's Society of Petroleum Engineers, biennial petroleum engineering conference, University of Illinois campus, Urbana.

5-7 Indiana Geological Survey, Indiana Department of Conservation, University of Indiana department of geology, tenth geologic field conference, stratigraphy of the Silurian rocks of northern Indiana, Marion, Ind.

7-10 American Institute of Chemical Engineers meeting, Sheraton-Cleveland Hotel, Cleveland.

8-11 American Petroleum Institute, Division of Refining, midyear meeting, Rice Hotel, Houston.

8-12 American Gas Association, distribution and production conference, Sheraton Hotel, Philadelphia.

9-11 Western Joint Computer Conference and Exhibit, Ambassador Hotel, Los Angeles.

10-12 American Society of Mechanical Engineers, production engineering conference, Royal York Hotel, Toronto.

10-12 Canadian Institute of Mining and Metallurgy, oil and gas division, and Calgary and Edmonton petroleum engineering sections of Canadian Institute of Mining and Metallurgy and American Institute of Mining, Metallurgical, and Petroleum Engineers, annual meeting, McDonald Hotel, Edmonton, Alta.

11-12 American Petroleum Institute, Division of Production, Pacific Coast district meeting, Biltmore Hotel, Los Angeles.

11-12 Texas A. & M. College, thirteenth oil recovery conference, College Station, Tex.

12 Natural Gasoline Association of America, Permian basin regional meeting, Lincoln Hotel, Odessa, Tex.

14-17 Texas Independent Producers and Royalty Owners Association, Scharbauer Hotel, Midland, Tex.

16-19 American Petroleum Institute, Division of Marketing, midyear meeting, Americana Hotel, Miami Beach.

17-19 Western Petroleum Refiners Association, Mid-Continent regional technical-industrial relations meeting, Hotel Lassen, Wichita.

17-19 Society of Professional Well Log Analysts, second annual meeting and logging symposium, Sheraton-Dallas Hotel, Dallas.

21-24 American Petroleum Institute, Division of Transportation, midyear highway conference, Bellevue Stratford Hotel, Philadelphia.

24-25 Western Petroleum Refiners Association, computer conference, Ben Franklin Hotel, Philadelphia.

25 Pennsylvania Grade Crude Oil Association, annual meeting, Pennhills Club, Bradford, Pa.

25-26 American Institute of Mining, Metal-

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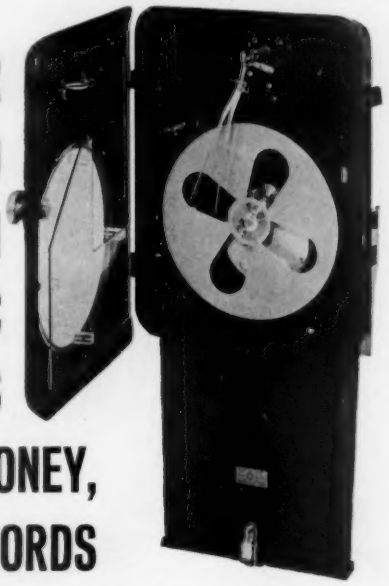

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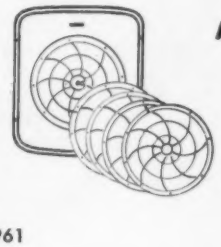

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lurgical, and Petroleum Engineers, annual Rocky Mountain petroleum sections, joint meeting, Farmington, N. M.

25-26 American Gas Association, gas transmission conference, Brown Palace and Cosmopolitan Hotels, Denver.

JUNE

1-2 Kentucky Oil and Gas Association, annual meeting, Phoenix Hotel, Lexington.

1-3 Interstate Oil Compact Commission midyear meeting, Shamrock - Hilton Hotel, Houston.

5-6 Petroleum Electric Power Association, meeting, Mayo Hotel, Tulsa.

6-8 Instrument Society of America, summer instrument - automation conference and exhibit, Royal York Hotel and Queen Elizabeth Hall, Toronto.

6-8 Sixth annual Appalachian underground corrosion short course, West Virginia University, School of Mines, Morgantown, W. Va.

9-17 European Congress of Chemical Engineering and Achema Congress, thirteenth exhibition and congress of chemical engineering, Frankfurt am Main, Germany.

11-15 American Society of Mechanical Engineers, summer annual meeting, Statler Hilton Hotel, Los Angeles.

12 Instrument Society of America and Air Pollution Control Association, air pollution instrumentation symposium, Hotel Commodore, New York City.

12-14 American Petroleum Institute, Division of Transportation, annual tanker conference, Oyster Harbors, Cape Cod, Mass.

12-16 Gordon Research Conferences, petroleum, Colby Junior College, New London, N. H.

13-16 Instrument Society of America, biennial international gas chromatography symposium, Kellogg Center, Michigan State University, East Lansing, Mich.

19-23 Harvard University, School of Public Health, air cleaning institute, Cambridge, Mass.

19-23 Gordon Research Conferences, catalysis, Colby Junior College, New London, N. H.

20-24 Canadian Gas Association, annual meeting, Banff Springs, Alta.

22-24 American Association of Petroleum Landmen, annual meeting, Shamrock Hilton Hotel, Houston.

23-30 Instrument Society of America, joint automatic control conference, Boulder, Colo.

25-30 American Society for Testing Materials, annual meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

26-27 Michigan Gas Association, annual meeting, Grand Hotel, Mackinac Island, Mich.

26-July 7 Massachusetts Institute of Technology, summer program on dynamics and control of chemical engineering processes, Cambridge, Mass.

28-30 International Gas Conference, Stockholm, Sweden.

JULY

4-7 National Society of Professional Engineers, twenty-seventh annual meeting, Olympic Hotel, Seattle.

6-8 International Oil Scouts Association, annual meeting, Roosevelt Hotel, New Orleans.

19-21 University of Michigan, summer course on underground storage of natural gas, Ann Arbor, Mich.

26-28 American Petroleum Institute, Division of Production, eastern district, meeting, The Greenbrier, White Sulphur Springs, W. Va.

AUGUST

2-4 Wyoming Geological Association, sixteenth annual field conference, Green River, Wind River, and Powder River basins.

28-Sept. 1 American Society of Mechanical Engineers, international heat transfer conference, Boulder, Colo.

SEPTEMBER

5-8 American Chemical Society, Chicago section, eleventh national chemical exposition, International Amphitheatre, Chicago.

11-15 Instrument Society of America, fall instrument-automation conference and exhibit and sixteenth annual meeting, Biltmore Hotel and Memorial Sports Arena, Los Angeles.

12-13 American Gas Association, Southern Gas Association, annual accident prevention conference, Statler Hilton Hotel, Dallas.

13-15 Pacific Coast Gas Association, convention and annual meeting, Coronado Hotel, Coronado, Calif.

13-15 Mid-Continent Oil and Gas Association, Louisiana-Arkansas division, annual meeting, Roosevelt Hotel, New Orleans.

13-15 National Petroleum Association, annual meeting, Traymore Hotel, Atlantic City, N. J.

14 Natural Gasoline Association of America, Rocky Mountain regional meeting, Northern Hotel, Billings, Mont.

17-20 American Institute of Electrical Engineers, annual electrical conference of the petroleum industry, Jung Hotel, New Orleans.

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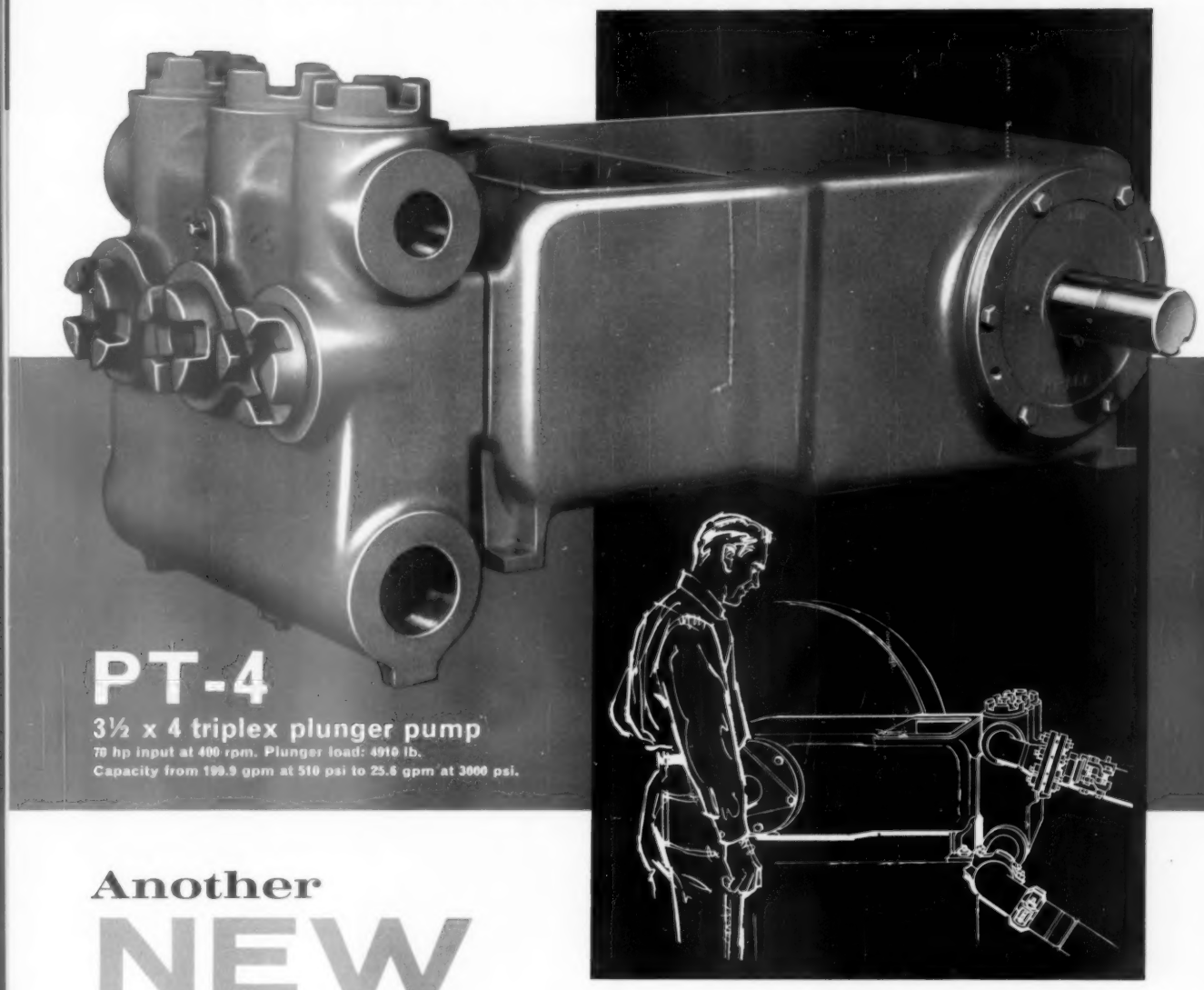

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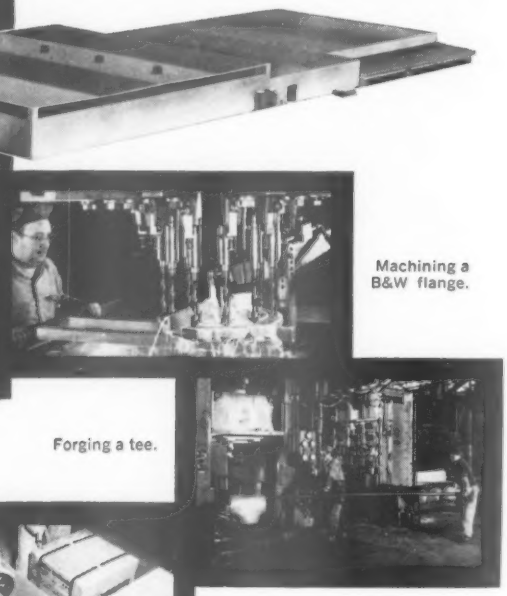
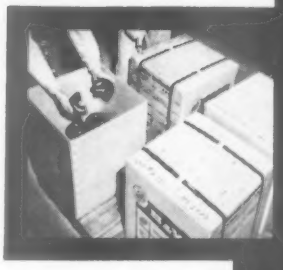
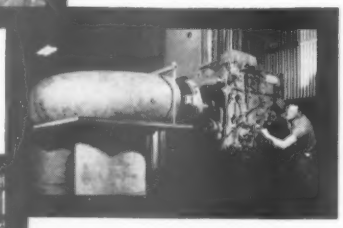


Machining a B&W flange.

Forging a tee.



Packing fittings for shipment.



Machining a 24" elbow

The paint line.

The transfer of B&W's welding fittings operations from Milwaukee to Beaver Falls is now complete. In full operation is the newest, most modern source for welding fittings and flanges in the industry. In full operation is a welding fittings plant that is integrated with B&W's facilities for steel and tube-making.

In terms of practical benefits to you, this means:

- You can get a complete line of welding fittings and flanges, quality controlled at every step of the production process from melt to the finished product.
- You can get a complete process piping package . . . welding fittings, flanges and tubular products from a single source . . . job-matched to end-use service.
- You can more effectively coordinate and control specifying, buying and delivery from one manufacturer.
- You can get on-time deliveries because complete integration permits flexible production schedules, particularly in the specialized steels.

For further details on how B&W's new fittings plant with its integrated facilities and services can help you, contact any of the local B&W District Sales Offices or write The Babcock & Wilcox Company, Tubular Products Division, Welding Fittings Plant, P.O. Box 230, Beaver Falls, Pennsylvania.

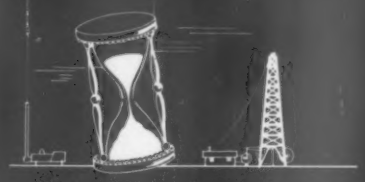
B&W

THE BABCOCK & WILCOX COMPANY

TUBULAR PRODUCTS DIVISION

TA 1020 F

Seamless and welded tubular products, solid extrusions, seamless welding fittings and forged steel flanges—in carbon, alloy and stainless steels and special metals



the Journal said...

50 years ago

April 13, 1911

J. F. Lucey Co., of Los Angeles, has received from Burmah Oil Co. what is believed to be the largest single order for oil-well tools and supplies ever placed with any American supply house. Purchase price of the order amounts to several hundred thousand dollars. Shipment is destined for Burmah oil fields of India.

Dr. Diesel, inventor of an oil engine, predicts there soon will arise a general tendency toward adoption of oil as a motive power for all kinds of vessels, including warships. He estimates 250 ships, naval and commercial, already have been or are being fitted with oil engines.

Natrona Pipe Line & Refining Co. leases a 760-ft.-sq. tract of land at Casper, Wyo., and announces it will start erection of a refinery on it within 2 months. Midwest Oil Co., which is laying an oil pipeline from Salt Creek field to Casper, is reported to be cooperating in the refinery project.

25 years ago

April 9, 1936

Magnolia Petroleum Co., The Texas Co., and Gulf Oil Corp. start widespread checkerboard lease buying in western Nebraska. Geologists picture Nebraska as next state to get extensive exploratory drilling. First commercial production is yet to be found.

Michigan's biggest gas well to date blows in with daily flow of more than 50 M.M.c.f. from stray sand at 1,298-1,312 ft. Commercial Oil & Gas Co.'s 1 De-Spelder, near Six Lakes, in Montcalm County, exceeds previous biggest well by several million cubic feet.

Expanding oil-proration problems lead Stanolind Oil & Gas Co. (now Pan American Petroleum Corp.) to set up separate proration engineering department headed by Ralph L. Marek, formerly chief engineer in charge of engineering and conservation in East Texas field for the Texas Railroad Commission.

10 years ago

April 12, 1951

Amerada Petroleum Corp. completes first commercial oil well in North Dakota. Its 1 Clarence Iverson wildcat, near Tioga, in Williams County, flows 307 bbl. of 53°-55°-gravity oil in 17 hours through ¾-in. choke from Devonian pay at 11,630-60 ft. Nearest oil production is 300 miles southwest in Wyoming.

Crude-oil production in United States passes 6,000,000 bbl. daily for first time. New all-time high of 6,056,625 bbl. in daily average is increase of 88,325 bbl. over record of previous week.

JOURNALLY SPEAKING

Youth Movement

THERE is a lot of talk these days, most of it in a joking vein, about the youthful team of executives that youthful President Kennedy has brought to Washington to make and execute policies for the federal Government.

But have you taken a good look at the oil business lately? The same thing is going on here. The crew-cuts are displacing the graybeards in astonishing numbers in policy-making positions in both large and small oil companies.

This isn't just an optical illusion, like the old grad who went back to a college reunion and was shocked at how all his classmates had aged. It's more than the normal attrition among senior executives and the customary promotion of the No. 2 men to fill their posts.

The youth movement in the oil industry is pretty close to a revolution, only it has been going on for 2 or 3 years and so hasn't had such dramatic notice as the age-bracket shift in Washington.

This is going to result in a really "new" oil industry, mark our words. By the time these youngsters get through shaking things up the old-timers may hardly recognize the business. The old order changeth (pardon our archaic lisp) and right now it changeth pretty fast.

The oil industry brags that it is progressive, but it ain't seen nothin' yet. It just isn't possible for old men to be as progressive as young men. It used to be taken for granted in most oil companies that junior executives were men in their fifties, with some 30 years with the company. Today a good many companies have top executives in their thirties and forties.

There was an old half-truth, half-joke in some companies that when the chairman of the board died the company hired a new office boy and everybody else moved up one notch. Such a psychology was practically a guarantee against any important break with tradition.

Nowadays the young executives in some companies are playing musical chairs, moving from one department to another before they have a chance to learn that there's only one way to do things because that's the way they always have been done.

If this trend continues—and we see n o t h i n g to indicate that it won't—these young-men-in-a-hurry are going to infuse the whole industry with a new shot of energy and a new flood of ideas. They don't have sense enough to know that a thing can't be done, so they just go ahead and do it.

This is all going to be for the good, though the oldsters may cluck their tongues and drag their heels. The past generation of oil executives got the industry into a bit of a mess, or at least a period of stunted growth. The oncoming generation is going to get things moving fast again, or bust a gusset in the attempt.

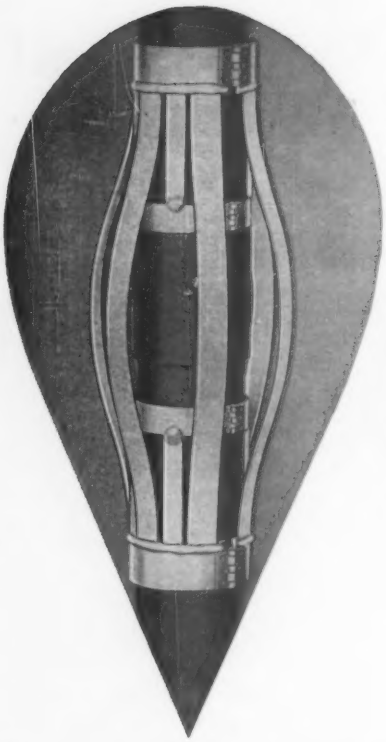
These young fellows are lean and hungry, they are full of energy and keep on their toes, and they welcome i m a g i n a t i o n and new approaches. What's most important, they thrive on competition—and competition is what the oil business has plenty of right now.

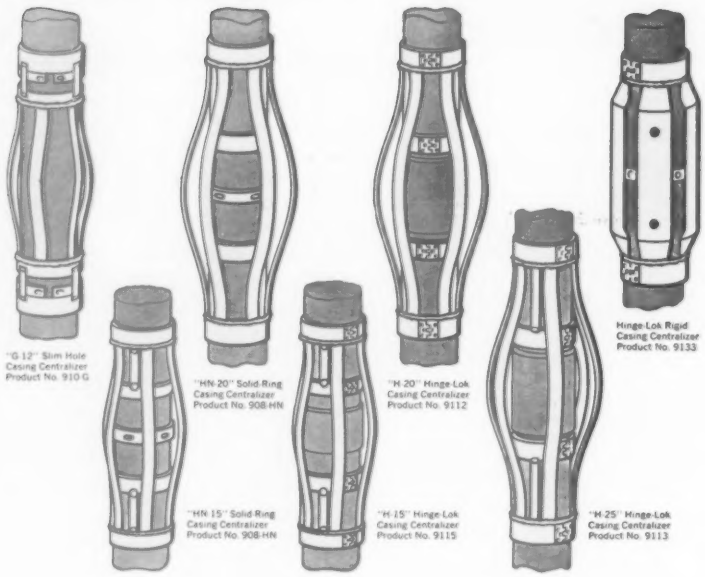
Every analysis made of the oil industry in the past several years has stressed that the business is going to be highly competitive—worldwide and domestically—and that a successful company must be flexible, adaptable to change, and open to opportunities.

And who but youngsters can fill that prescription best? They may make some mistakes in their pioneering, but they'll shake up everybody's viewpoints and methods of operating, and this is bound to lead to progress. Those companies that are putting youth at the helm apparently feel that the challenge of today's business problems can be met only with fresh approaches.

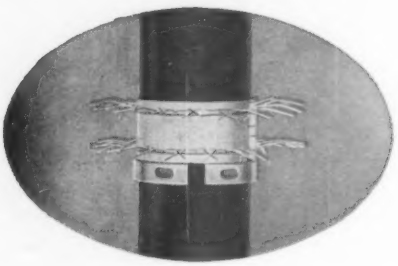
So get ready for changes all up and down the line, you old-timers! Maybe your business is in a rut—and maybe you like the rut—but some of your bright-eyed, crew-cut competitors are preparing to show you a thing or two.

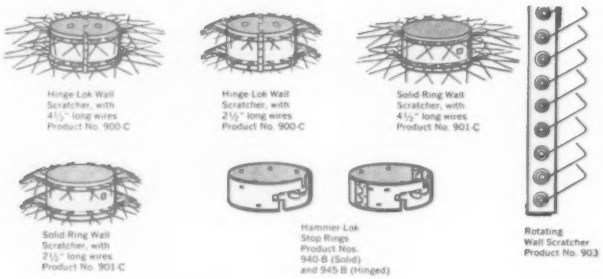
—Henry D. Ralph




"G-12" Slim Hole Casing Centralizer Product No. 910-G
"HN-20" Solid-Ring Casing Centralizer Product No. 908-HN
"H-20" Hinge-Lok Casing Centralizer Product No. 9112
Hinge-Lok Rigid Casing Centralizer Product No. 9133
"HN-15" Solid-Ring Casing Centralizer Product No. 908-HN
"H-15" Hinge-Lok Casing Centralizer Product No. 9115
"H-25" Hinge-Lok Casing Centralizer Product No. 9113

A good cement job starts with two things




Hinge-Lok Wall Scratcher, with 4½" long wires Product No. 900-C
Hinge-Lok Wall Scratcher, with 2½" long wires Product No. 900-C
Solid-Ring Wall Scratcher, with 4½" long wires Product No. 901-C
Solid-Ring Wall Scratcher, with 2½" long wires Product No. 901-C
Hammer-Lok Stop Rings Product Nos. 940-B (Solid) and 945-B (Hinged)
Rotating Wall Scratcher Product No. 903

A good primary cementing job starts with centered casing and a good bonding surface. The only centralizers and scratchers good enough for this important job are the best ones you can get. That's where Baker comes in...

BAKER CENTRALIZERS are tough and resilient to withstand running-in forces. They are made in a wide range of spring-bow heights to provide one exactly right for your specific casing program. That's why when you're landed your casing has adequate clearance for good cementing. For installation convenience, Baker Centralizers come in both Hinge-Lok and Solid-Ring types.

BAKER SCRATCHERS glide down the hole without disturbing the mud cake; and when activated in the cementing area they dig in and remove the mud cake ensuring a good bonding surface. Baker Reciprocating Scratchers come with either long or short wires, in Hinge-Lok or Solid-Ring types. Baker Rotating Scratchers come in five-foot sections, and feature "plow angle" scratcher wires that are effective regardless of annular clearances.

NO WELD INSTALLATIONS of centralizers and scratchers are easier and better with Baker Hammer-Lok Stop Rings. Just a hammer blow locks one on. And they stay put because inserted teeth give them a much stronger grip than other friction-type stop rings.

Baker Primary Cementing Equipment is conveniently available at Supply Stores in the United States and Canada.

BAKER
CENTRALIZERS • SCRATCHERS

BAKER OIL TOOLS, INC.
HOUSTON / LOS ANGELES / NEW YORK

Our fuels policy is not drift and default

SECRETARY of the Interior Stewart Udall won cheers from a meeting of coal producers when he endorsed a study of national fuels policy with the statement, "We cannot, in something as important as fuels and energy, let policy be set by drift or by default."

What does he mean by that? Does he mean (as some political observers have suggested) that the Kennedy administration believes that any policy not formulated by it is default?

Does he mean (as some critics charge) that disciples of statism in high administration posts think that competition and free enterprise constitute drift?

MR. UDALL should be set straight. The Congress and his official predecessors have had some very specific and positive petroleum policies. Examples:

- Antitrust and related laws have enforced competition and fostered the growth of independents by many legal devices, such as making all pipelines common carriers.
- The percentage depletion-tax provision and the public-lands leasing programs were deliberate steps to increase domestic reserves.
- Federal regulation of the oil industry was considered and rejected in favor of state conservation control.
- U. S. oil companies were encouraged and supported in programs to develop foreign sources of petroleum.
- Import controls were carefully calculated to maintain an announced balance between foreign and domestic supplies.

There is no "default" there. And as for "drift," it has been the deliberate policy (not a default in policy) of this nation to let the courses of the fuels industries be determined by consumers' choice and by the enterprise of competing participants in those industries.

The Secretary's charge has substance in only one area—natural gas. Ever since the Supreme Court reversed the policy written into the statute, the FPC and the judiciary have been drifting futilely while Congress has defaulted in setting new policy.

LET'S HAVE A STUDY of national fuels policy, sure. But let's start with facts, not assumptions and prejudices. And one of the first facts to be established is that our past policies have been quite specific, purposeful, and consistent, remarkably free from drift and default.

The oil industry can defend our present national fuels policy as one that has worked to the benefit of consumers and completely in the public interest. The fact that some oil men may want changes in details does not condemn the soundness of our basic policy.

Let coal offer a better policy if it can. But don't condone the delusion that we have no national fuels policy. We have one, and it's a good one.

Pipeline machine cleans and primes "on the run"!

This Williams Brothers' Cleaning and Priming Machine brushes pipelines clean of rust scale and dirt, then applies primer to the cleaned surface, while rolling along the pipe itself. In a "Big Inch Spread," downtime at this point in the operation can halt work on the total job. That's why reliability is such a strong reason for choosing rugged, dependable Ford Industrial Engines . . . engines that have earned an enviable reputation for reliability and long, useful service in oil field operation.

And weight is an important factor in an operation like this, where the pipeline supports the machine! Compact, modern Ford Industrial Engines deliver *more horsepower per pound of engine weight than ever before possible!* Along with the weight savings, engineers are allowed greater freedom of design.

Only Ford offers a full line of modern, overhead-valve-design engines to meet your *exact* power requirements. With overhead valves, you get quicker, easier servicing . . . and Ford's short-stroke design minimizes friction and delivers more usable power from every drop of fuel. To help pare downtime even more, your nearest Ford Dealer carries all the more commonly purchased replacement parts.

Ford engines range from 134 to 534 cubic inches, including modern diesels. Engine assemblies are available as complete power units, foot- or skid-mounted. It'll pay you to specify Ford Industrial Engines the next time you're in the market for *dependable industrial power!*

YOUR JOB IS WELL-POWERED WHEN IT'S FORD-POWERED!

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INDUSTRIAL ENGINES AND POWER UNITS

INDUSTRIAL ENGINE DEPARTMENT, FORD DIVISION, FORD MOTOR CO., P.O. BOX 598, DEARBORN, MICH.

West of Rockies write to:
→ FORD INDUSTRIAL ENGINE DEPT., P.O. BOX 6787, LOS ANGELES 22, CALIF.
→ FORD INDUSTRIAL ENGINE DEPT., P.O. BOX 1666, RICHMOND, CALIF.

Pickup in Last Half Made 1960 Good

• Oil's annual reports attribute recovery in last 6 months of 1960 to improved prices, jump in natural gas sales. Petrochemicals and economy campaigns also helped. First quarter of '61 looks bright to most firms.

STOCKHOLDERS now receiving annual reports on 1960 business of the nation's oil companies are finding them good reading.

The reports show 1960 was a good year for profits despite a poor first half and restricted crude production in prorated states. Company executives attribute this remarkable second-half recovery in the industry to:

... **Price improvement** in the last half in major products which resulted from tighter operations and inventory control.

... **A big boost in sales of natural gas** and natural-gas liquids.

... **Increased emphasis** on producing and marketing high-profit products, such as petrochemicals.

... **Effects of economy** campaigns and tighter management.

In fact, taken as a whole, the reports reflect a spirit of optimism among leading oil executives. Many officials report the momentum generated in 1960 is carrying into the first quarter of 1961 which they expect to be a very good profit period.

Company heads also have trimmed overhead and upgraded facilities over the last 2 years to put their companies in a better position to convert sales into profits.

The trends . . . The reports give this general financial picture of the oil industry:

... **Profits up.** Only 10 of 33 companies registered a decline. These drops were due mainly to peculiar circumstances, such as location of the bulk of their production in prorated states, depressed prices in their marketing areas, unusual write-offs, etc.

Only one larger company—Plymouth Oil—actually reported a loss, and in this instance management decided to write off some dry-hole losses all in one year.

... **Capital spending** leveled off. Sixteen companies trimmed their capital outlays. Spending continued heavy for exploration and production with emphasis on brighter prospects or more profitable ventures. Marketing also came in for a larger percentage of spending. Money put into new plant facilities for the most part was used to upgrade products or increase efficiency rather than make additions to capacity.

Most of the companies were able to generate bulk of their own capital for 1960 spending and expect this to continue through 1961 when an increase in capital spending is anticipated.

Although 13 firms show a decline in working capital at the end of 1960, the industry is expected to generate a surplus cash flow over the next 3 years to take care of its capital needs (OGJ, Mar. 20, p. 70).

... **Operations volumes** were up for liquids production, refinery runs, and product sales. Drilling operations generally were off sharply as oil management became more selective in exploration.

Eighteen firms managed to reduce the number of employes during the year but only nine of these were able to trim payroll costs. This was due primarily to the general 5% wage increase in 1960.

The outlook . . . Many company executives report they expect the in-

How Oil's Profits Compare With Other Industries'

• THE JOURNAL study of 33 leading oil companies shows:

	Assets	Profits	Return
1960	$37,606,359,000	$2,866,706,000	7.62%
1959	35,954,444,000	2,658,771,000	7.39%

• THE NATIONAL City Bank of New York in a compilation just released ranks petroleum production and refining 25th among industrial groups in return on net assets for 1960.

This represents a big jump for oil from 40th place in 1959. Actual return rose from 10% to 10.2%. The bank studied 125 oil companies and used as net assets the balance of assets over liabilities.

Other leading industrial groups showed these returns:

	1960	1959
Drugs and medicine	20.0%	21.9%
Soaps and cosmetics	17.0	16.8
Automobiles and trucks	15.8	17.4
Tobacco products	14.6	15.0
Office equipment	14.2	14.0
Instruments, photographic supplies	14.1	16.4
Chemical products	12.9	14.4
All manufacturing (average)	10.5	9.8

Here's a Rundown on Operations of 33 Oil Companies

	Liquids Production (Bbl. daily)		Refinery Runs (Bbl. daily)		Sales of Pet. Products (Bbl. daily)		No. of Employes	
	1960	1959	1960	1959	1960	1959	1960	1959
Jersey Standard	2,193,000	2,464,000	2,871,000	2,789,000	3,163,000	2,991,000	140,000	146,000
Gulf	1,505,990	1,344,914	759,152	685,101	842,054	821,260	47,400	50,700
Texaco	1,352,355	1,253,920	1,327,864	1,231,290	1,374,789	1,328,544	56,658	53,510
Socony Mobil	737,704	749,000	981,000	939,000	1,129,000	1,074,000	66,000	73,600
Indiana Standard	318,994	307,686	636,326	598,280	686,240	666,895	41,706	43,569
California Standard	987,600	886,600	841,000	790,000	976,100	870,800	37,986	38,390
Shell	370,000	366,000	501,000	490,000	577,000	562,000	38,290	38,217
Phillips	282,000	263,000	230,000	237,000	407,000	408,000	25,209	24,575
Sinclair	182,785	177,359	418,688	428,236	461,872	459,421	21,770	23,557
Cities Service	138,437	137,866	293,615	280,000	324,751	332,205		
Tidewater	114,000	113,000	240,000	227,000	232,000	198,000	9,036	9,361
Continental	198,237	190,516	181,927	180,867	221,856	221,212	11,669	11,333
Atlantic Refining	152,692	137,699	193,017	194,819	197,296	200,871	13,967	15,394
Union	102,617	91,877	166,975	172,682	217,803	214,093	7,311	7,332
Sun Oil	149,937	129,408	225,290	232,356	228,929	234,523	17,219	17,292
Sunray	88,719	86,131	148,145	154,026	161,660	160,788	5,768	5,894
Pure	75,986	65,636	166,527	166,356	190,727	179,951	10,108	10,740
Ohio Oil	110,870	109,298	100,066	100,268	97,228	94,191	7,631	7,534
Richfield	76,607	72,164	148,331	137,814	142,781	130,775	6,303	6,374
Skelly	63,196	64,465	48,865	48,882	83,908	81,029	4,727	4,787
Ohio Standard	39,348	38,941	137,306	138,986	129,353	130,274	10,308	10,690
Amerada	80,879	82,478						
Champlin	16,369	14,246	27,000	27,000	28,551	28,612		
Apco	14,218	14,175	30,303	30,074	33,291	32,060		
Honolulu	50,200	46,500					762	730
Delhi-Taylor	5,505	5,946	42,784	40,992			757	681
American Petrofina	8,885	9,312	36,205	39,063	38,879	40,780		
Tex. Pac. Coal & Oil	20,230	20,139					435	449
Plymouth	13,254	14,986	25,355	31,600	32,634	37,287	907	927
Colorado Oil & Gas	7,551	6,681	17,014	17,168				
Texas Gulf Prod.	13,300	12,880						
Louisiana Land	29,252	26,004						
Clark Oil & Ref.			30,817	30,408	32,842	33,823	2,650	2,880

*U. S. and Canada only.

dustry to have another good year in 1961.

Indiana President John E. Swearingen notes "general indications are that integrated oil companies will report an increase. We are looking for a pickup in general business by summer and are expecting to see a definite upturn in the second half."

Swearingen says Indiana Standard will make a substantial increase in capital expenditures this year, probably exceeding $300 million compared with $251.5 million in 1960. The company's product sales set a record last year and so far this year have exceeded the same 1960 period. Sales of natural gas, natural-gas liquids, and chemical products also reached high levels.

In further remarks, Swearingen reveals thinking common to many oil firms. He says a program to increase the company's profitability is bearing fruit. It is based on reducing costs and taking advantage of new investment opportunities. He notes Indiana Standard has streamlined its organization and installed labor saving equipment throughout the company, about reaching the end of the line in this means of offsetting high labor costs.

Swearingen told Chicago security analysts last month that since 1956 the company had reduced its labor force 10,300 or about 20% and cut payroll costs $26 million since the peak in 1957.

"Had we not reduced our work force," he said, "our wage bill in 1960 would have been some $80 million higher than it actually was."

Gulf Oil Corp., reports 1960 was the best operational year in its history, with 60% of its total income provided by domestic operations. Back of the record year were increased production, heavy sales of natural gas, LPG, and petrochemicals. Gulf's domestic sales of refined products actually declined 4% but showed a good return because of a new emphasis on profitable marketing.

Other companies reporting unusual activity in 1960 are:

... **Texaco which** achieved new records in earnings, sales and operations. Production of crude and natural gas both reached new high levels in the Western Hemisphere, and Texaco refinery runs were close to capacity most of the year. The company had one of the highest ratio earnings to assets, topped the industry in drilling activity and was one of the few firms to increase its work force.

... **Phillips'** earnings of $112.9 million set a record for the second straight year, and a further rise is expected in 1961. Factors responsible are rises in returns on chemical expansion of recent years, stepped-

Compared With '59

Payroll Costs and Other Benefits ($ Thousand)		Net Wells Drilled	
1960	1959	1960	1959
917,000	969,000	1,438	
308,849		1,145	1,502
357,018	341,514	1,616	1,542
327,200		*332	*536
343,997	348,411	963	837
		544	470
346,262	341,567	970	1,053
199,674	190,558	311	334
165,776	168,332	313	415
		550	539
63,659	64,098	348	390
83,720	80,399	597	616
102,623	108,649	140	288
65,423	64,933	174	130
129,857	128,149	*501	*581
41,075	41,687	258	249
73,383	74,939	162	*219
56,576	55,970	510	405
46,682	46,808	82	98
32,592	32,262	268	355
76,945	80,254	43	39
		174	196
		141	
		87	81
		197	172
		71	57
		29	
		147	125
7,220	7,356	30	38
		56	
		22	
		178	170

How the 10 Top Companies Rank in:

Capital Spending

		1960	1959
1.	Jersey Standard	$919,218,000	$1,000,000,000
2.	Texaco	521,103,000	517,870,000
3.	California Standard	369,936,000	399,092,000
4.	Gulf	346,155,000	335,771,000
5.	Socony Mobil	320,000,000	357,000,000
6.	Shell	284,041,000	280,073,000
7.	Indiana Standard	251,574,000	268,868,000
8.	Phillips	180,700,000	120,800,000
9.	Sinclair	121,233,000	118,487,000
10.	Continental	120,880,000	98,994,000

Domestic Crude Production (Bbl. daily)

		1960	1959
1.	Texaco	555,778	507,916
2.	Jersey Standard	439,000	440,000
3.	Shell	370,000	315,900
4.	Gulf	343,736	332,713
5.	California Standard	*318,773	*308,849
6.	Indiana Standard	*299,283	*305,839
7.	Socony Mobil	*230,000	*231,000
8.	Phillips	222,500	220,100
9.	Sinclair	*138,957	*136,767
10.	Cities Service	*138,437	*137,866

*U. S. and Canada.

Domestic Gas Production (M.c.f. daily)

		1960	1959
1.	Phillips	2,860,000	2,798,919
2.	Jersey Standard	1,560,000	1,526,000
3.	Indiana Standard	1,500,000	1,509,343
4.	Texaco	*1,404,000	1,290,778
5.	Gulf	1,148,208	952,357
6.	Socony Mobil	1,138,000	1,046,000
7.	Shell	1,063,890	941,408
8.	Cities Service	885,246	867,950
9.	California Standard	592,243	483,934
10.	Sinclair	430,618	392,200

*Western Hemisphere.

up sales of natural gas and its liquids, and new Venezuelan crude production.

Phillips officials expect higher average petroleum product prices this year and a drop in company expenses to help 1961 profits. The drop in expenses is expected to come from completion of the "new look" painting program in all Phillips facilities and the stepped-up lease evaluation program.

... **California Standard** reports third highest net income in its history stemming from a 7% gain in revenue, a 11% gain in worldwide production, a 23% jump in natural-gas sales, and a 9% gain in chemicals.

President T. S. Petersen notes further improvement of 25% in natural-gas sales is anticipated for 1961 and the company plans large-scale extensions of its chemical business around the world.

... **Shell,** with record sales and other operating revenue, shows a slight decline in earnings due to a drop in unit returns and higher costs. Shell also stepped up its capital spending for the year nearly $4 million, 70% going to exploration and production and 12% to marketing. Shell had a 4,000-bbl. daily gain in crude production, an 18% increase in natural-gas sales, a 3% gain in sales of products including an 80% increase in jet fuel.

Shell President Monroe E. Spaght comments that "problems of oversupply and surplus capacities are still with us, but what changes have occurred in the past year have been improvements. Taking a broad view, we are most optimistic about the ability of our company to prosper in the years ahead."

... **Sinclair's** gain in earnings was soundly based on record product sales plus increases in production of crude and natural gas and a growth in petrochemical activities. Nonetheless, profits were curtailed somewhat by a 1.3% decline in the average price of principal petroleum products.

Sinclair Chairman P. C. Spencer declares the outlook for further improvement in Sinclair's profits in 1961 is good "provided the industry does not create an oversupply of products with the inevitable danger to prices."

... **Cities Service** recorded a 2.6% decline in earnings despite new highs in liquids production, volume sales of oil products, petrochemicals, and natural gas.

Chairman Burl S. Watson says

A Glance at Financial Figures of 33 Oil Firms

Rank by Assets		Assets ($ Thousand) 1960	Assets ($ Thousand) 1959	Net Profits ($ Thousand) 1960	Net Profits ($ Thousand) 1959	% Return on Assets	Per Share Profit 1960	Per Share Profit 1959	Working Capital ($ Thousand) 1960	Working Capital ($ Thousand) 1959
1.	Jersey Standard	6,829,181	6,687,692	688,573	629,779	10.1	3.18	2.93	1,758,000	1,704,000
2.	Gulf	3,843,429	3,576,318	330,311	290,467	8.6	3.20	2.82	781,185	690,656
3.	Texaco	3,646,773	3,347,743	391,751	354,346	10.7	6.34	5.85	1,078,034	953,102
4.	Socony Mobil	3,455,382	3,347,398	182,610	164,952	5.3	3.76	3.38	732,000	686,000
5.	Indiana Standard	2,925,731	2,846,502	144,762	139,597	4.9	4.05	3.90	582,724	545,247
6.	California Standard	2,782,283	2,578,296	266,113	258,599	9.6	4.21	4.01	429,800	416,474
7.	Shell	1,885,344	1,767,309	144,588	147,418	7.7	2.39	2.43	298,216	284,606
8.	Phillips	1,646,800	1,579,900	112,900	104,600	6.9	3.29	3.05	195,706	219,853
9.	Sinclair	1,465,919	1,486,567	52,547	45,027	3.5	3.42	2.93	313,994	300,400
10.	Cities Service	1,342,645	1,298,235	41,320	42,434	3.1	3.85	3.95	296,720	308,369
11.	Tidewater	897,849	856,413	35,063	33,941	3.9	2.22	2.13	86,604	89,707
12.	Continental	832,538	787,708	61,232	60,272	7.4	2.90	2.85	96,943	104,608
13.	Atlantic Refining	819,891	807,813	46,566	30,174	5.7	5.00	3.19	83,948	63,504
14.	Union	733,937	707,166	34,478	27,515	4.7	3.96	3.16	140,331	164,067
15.	Sun Oil	617,819	581,704	49,272	42,844	8.0	3.78	3.48	146,100	153,800
16.	Pure	591,915	552,907	32,555	28,905	5.5	3.29	3.32	129,308	129,581
17.	Sunray	589,216	582,284	41,121	43,815	7.0	2.10	2.25	91,670	94,351
18.	Ohio Oil	469,983	462,527	39,215	38,633	8.3	2.84	2.76	79,383	88,141
19.	Richfield	433,890	422,325	28,720	28,058	6.6	7.11	6.95	117,877	114,405
20.	Skelly	387,812	377,144	24,415	26,906	6.3	4.32	4.68	56,466	52,180
21.	Ohio Standard	291,748	280,477	24,662	25,061	8.5	4.94	5.62	79,202	72,604
22.	Amerada	199,857	188,349	27,569	25,787	13.8	4.37	4.08	67,283	58,044
23.	Champlin	122,477	121,327	9,156	8,547	7.5	2.14	2.00	13,504	12,991
24.	Apco	101,066	96,416	5,292	6,885	5.2	2.79	3.90	17,510	15,783
25.	Honolulu	99,187	97,728	10,363	12,894	10.4	2.77	3.44	17,405	19,672
26.	Delhi-Taylor	96,593	71,524	3,717	2,707	3.8	0.72	0.51	12,247	12,328
27.	American Petrofina	93,545	97,070	1,232	1,016	1.3	0.18	0.15	10,825	15,175
28.	Tex. Pac. Coal & Oil	81,749	78,702	7,778	7,197	9.5	2.00	1.85	11,575	11,085
29.	Plymouth	80,815	85,107	*(2,446)	2,186		(0.92)	0.84	14,346	14,637
30.	Colorado Oil & Gas	68,619	67,560	1,846	2,527	2.3	0.43	0.63	9,526	6,186
31.	Texas Gulf Prod.	60,521	53,881	4,700	4,189	7.8	1.16	1.04	13,647	10,235
32.	Louisiana Land	55,317	47,823	22,819	19,366	41.3	2.54	2.16	18,423	
33.	Clark Oil & Ref.	35,880	35,177	1,906	2,127	5.3	1.17	1.31	5,150	3,385

*Loss.

factors responsible for the decline were a substantial increase in provision for taxes, special charges caused by eliminating the minority interest in Arkansas Fuel Oil Corp., and continued unfavorable prices for oil products. Highlight of the year was the complete acquisition of Arkansas Fuel plus a general streamlining of the company's corporate structure.

... **Continental** earnings reached an all-time high, thanks to higher crude oil production, a reduction in provision for federal income taxes, and a drop in intangible development costs. Earnings would have been even higher except for lower average prices for refined products.

Continental has trimmed its capital expenditures budget for 1961 by about $10 million in view of the excess capacity in all phases of the industry and the modest increase in demand forecast for the year.

... **Sunray Mid-Continent** is another company reporting a record gross operating income but a decline in net earnings for 1960. Company executives say earnings were pinched by heavy proration of crude production and depressed product prices during the early part of the year.

Sunray, however, has budgeted a substantial increase in capital expenditures for 1961. It expects to spend $70 million on finding and developing reserves and building petrochemical facilities. Benefits of Sunray's 3-year modernization, efficiency, and cost-reduction programs also are expected to help profits in 1961.

... **Skelly's** income also was affected by severe crude oil proration, which limited the company's production, and by depressed product prices. Skelly's gasoline sales, however, jumped 8% and working capital at year end was up $4.28 million to $56.5 million. Stockholders' net book value increased from $59.69 to $62.48 per share during the year.

... **Ohio Oil** set new records in crude production and refined product sales in boosting net income during 1960. President J. C. Donnell II reports that planned expansion in the U. S. and progress abroad toward production and marketing of newly discovered Libyan crude are expected to spark a growth in Ohio's earnings in the next few years.

Indicative of Ohio's stepped-up activity is its drilling record. Ohio drilled or participated in 510 wells at home and abroad, an increase of 105 over the year before.

... **Richfield** is another oil company whose earnings rose on the tide of record production, refinery runs, refined product and petrochemical sales.

President Charles S. Jones expresses optimism at market prospects for 1961 on the West Coast. He anticipates that motor gasoline sales will be about 4% higher and jet fuels 10% with distillate fuel sales remaining about the same.

Miscellaneous products may suffer a 3% decline in sales, and some decline is expected for residual fuel oil.

... **Sun Oil** isn't planning to rest on its 1960 profits, second highest in company history. Officials plan to boost capital spending for new manufacturing plants by 300% and spending for new oil and gas production facilities by 17%.

Sun executives attribute the profits rise to cost cutting, increased oil and gas production, and developing a market for products that yield a higher return.

... **Ohio Standard** had a slight decline in net earnings despite record sales of its branded products and increased efficiencies at its new Toledo refinery and other facilities. Total volume of petroleum products sold declined due to a lessened demand for industrial products, particularly heavy fuel oil.

Sohio, however, has aggressive plans for 1961. It will modernize and expand its marketing facilities and will continue a selective exploration program for oil and gas in this country, Canada, and the Spanish Sahara. A jointly owned ammonia and urea plant also is scheduled to come on stream during the year.

... **Tidewater's** new operation policy paid off in increased profits for 1960. Record production was achieved by an emphasis on development drilling and curtailing wildcat operations in order to exploit more fully the company's reserves of oil and gas.

A youth movement in company ranks was promoted by a special voluntary early retirement program and resulted in increased efficiency and lower costs. The company plans new refining and chemical facilities this year in the U. S., Denmark, Norway, and Japan.

... **Union Oil** had a 25% increase in earnings, paced by a 41% gain in natural-gas sales and a 9% jump in crude-oil sales. The company reports noteworthy exploratory successes in the Louisiana offshore area, North Texas, western Oklahoma, New Mexico, Wyoming, California, and Alaska. Plans for 1961 include completion of a $20 million construction project at the Los Angeles refinery and a service-station modernization program.

... **Atlantic Refining** began showing results of a long-range management program begun in 1954 by increasing profits sharply in 1960 in spite of lower sales volumes and lower average price levels. It has achieved self-sufficiency in raw materials, has devised a more profitable product mix, and made substantial reductions in operating costs.

President Henderson Supplee, Jr., informs stockholders that the new strengths give Atlantic Refining a flexibility for sharp future growth. The management has plans to step up foreign exploration in Libya and the Spanish Sahara, intensify an expansion in marketing, and increase chemical activities.

... **Pure** had an excellent year with record highs in total income and sales of refined products, resulting in a rise in profits. The reason per share profits didn't increase in proportion to unit sales was due to unusually low product prices in Pure's marketing areas during the first half of 1960.

Pure during the year acquired the assets of Woodley Petroleum Co., an interest in Great Northern Oil Co., and other producing properties in the U. S. and Canada. The company plans to expand into petrochemicals in 1961 with completion of a jointly owned plant adjacent to the Smiths Bluff refinery near Beaumont, Tex.

Management view ... The reports give a remarkable insight into the thinking of oil-company management. And these are the general impressions on what may lie ahead:

... **Cost cutting** through reduction in payrolls has reached its peak. Economies in the future likely will come from efficiency of new equipment, from new processes, or refinements of old ones.

... **Cash flow** and earnings will provide the funds for needed modernization and expansion in the next few years and most companies plan to continue retiring their outstanding debts.

... **Exploration** will continue to be selective and the emphasis is growing on developing and producing more efficiently present holdings. This could mean an opening for independent wildcatters to get favorable farmouts or pick up lapsed leases.

... **Battle for markets** is getting underway in earnest. Companies are spending big money to create favorable images, modernize facilities, upgrade products—all to attract more customers.

... **New products** which give a better profit margin than the old standbys are constantly being sought.

... **An awareness** exists throughout oil management of the perils of the present overcapacity in manufacturing and production. Whether the companies by individual action will be able to manage the industry oversupply is the main question mark in oil's future in the next few years.

U. S. Firms to Make First Irish Tests

THE Republic of Ireland may get its first exploratory well by the end of the year.

Tentative plans for a test were announced after disclosure that Continental Oil Co. and Ohio Oil Co. will join Ambassador Oil Corp., Fort Worth, in exploration activities.

Ambassador will be the operator and plans immediate seismic work.

The company last year obtained a license to explore 20 million acres. The exclusive agreement covers the entire Republic of Ireland.

The agreement with Continental and Ohio is subject to approval by the government of the republic.

C. Harrison Cooper, executive vice president of Ambassador, says representatives of the three companies will meet in Dublin this week to work out details of the exploratory program.

The agreement with Ireland calls for starting a well by March 20, 1962, but Cooper said the test probably will start late this year.

Ireland has not rated as a prime potential drilling area in the past, but the three companies believe it has good prospects.

Sediments there are Carboniferous—equivalent to the Pennsylvanian and Mississippian in the U. S. There has been no drilling.

How Oil Issues Are Shaping Up Now in

• Spotlight's on proposed fuels study at present, since the struggle over who's to make it and what it will cover may be decided in this session. A legislative hassle also may develop over changes in regulatory agencies.

Clyde La Motte
Washington Editor

ANY LOOK at what is brewing in Congress that may affect the oil industry almost invariably focuses on the proposed fuels study.

There are other issues, large and small: The gasoline tax, the probability that the perennial attack on percentage depletion will flare up again, minimum-wage legislation, and kindred subjects.

1. Fuels study.

The top item, as most Washington oil observers continue to see it, is the matter of a fuels study.

For one thing, this issue is likely to be settled during the current session of Congress—while a lot of oil-related issues probably will be left until next year or later.

Many observers feel that the outcome of the struggle over the scope of a fuels study and who's to make it will tend to set a pattern for government activity in this area in the years ahead.

Some top White House advisers feel that the Government—particularly the executive branch—should take a stronger hand in shaping long-range uses and development of the nation's energy resources.

A fuels study headed by these advisers, therefore, might be pointed toward such an objective.

If the fuels study is handled by Congress, the outcome may be determined by how much emphasis it gets and by whom it is conducted.

Coal, of course, has long had hopes that it could influence the nature—and the outcome—of such a study.

However, several setbacks have caused the coal industry to modify its stand considerably. Now it is soft-pedaling any talk that smacks of end-use controls.

Even so, it seems inevitable that if a fuels study is launched there will be strong pressures from one group or another to head the Government toward more decision making in the energy field.

Right now, the issue is still up in the air. A few weeks ago it appeared that a House committee would make the investigation as a substitute for an earlier proposal for a joint Senate-House study.

But an offsetting move in the Senate gained momentum. This was a move to have the study made by a Senate committee (OGJ, Mar. 13, p. 104.)

In the background, but still definitely in the picture, is President Kennedy.

Kennedy, through Interior Secretary Stewart Udall, recently assured the coal industry that the administration will support pending congressional legislation for a fuels study.

The administration has carefully avoided taking sides in the intramural fight in Congress over who will do the study. However, the commitment to back a congressional study seemingly rules out any special study of the subject in the near future by the administration itself.

Once the question of who will do the study is settled, the important clue to watch for will be the emphasis given it. A frequently used maneuver in Washington is to assign a project to one group or another and then let it quietly die there.

But because of the uncertainties and the potential impact of deeper government involvement in energy questions, the issue of a fuels study must rank as the top oil-related issue currently facing the industry in Washington.

2. Federal agencies.

It may develop before summer is done that the hottest oil-related controversy in Congress will stem from proposed changes in the regulatory agencies.

The President is expected to make his recommendations to Congress on this subject soon. And it is expected that his recommendations will be based mainly on proposals by his chief adviser in this field, James M. Landis (OGJ, Mar. 27, p. 55).

On the face of it, it would seem that the administration's principal goals are to speed up the work of the agencies in order to cut down on the monstrous pileup of cases, and to improve the over-all efficiency of these agencies.

A drive toward such goals would get the enthusiastic support of virtually everyone.

But it's not as simple as that. There will be a tug of war over what changes should be made and who should make them. (Congress is pretty jealous of its jurisdiction in such areas as these, and will be hard to convince that it should give the executive branch greater power to direct the course of the agencies.)

Furthermore, once the tinkering with the agencies starts, just about everyone will try to get into the act.

For instance, if the President should propose that small natural-gas producers be exempt from regulation, it is likely that a change in the Natural Gas Act would be required to insure the legality of the action.

And once the Natural Gas Act is opened for change, you may be sure that all and sundry will rush in with their pet proposals.

Could it be that gas legislation in some form may reach the center of the stage this year almost inadvertently?

Some Washington observers doubt it. They feel that any project to overhaul the agencies will move too slowly to become an issue this year.

To support this, they point to the fact that Rep. Oren Harris (D.-Ark.) has already acted to set up a permanent subcommittee to keep an eye on the regulatory agencies and

to propose any changes it feels are needed.

This would appear to be a move aimed at letting the administration know that Congress is still in the driver's seat.

At any rate, the potential exists for a brief struggle that could have repercussions affecting natural-gas producers and other segments of the oil industry.

3. Gasoline tax.

So far this year, the biggest effort the industry has made in Washington has been to urge Congress to let the 4-cent federal tax on gasoline revert to three cents on June 30—as originally scheduled when the "temporary" 4-cent tax was levied.

The issue is still in the hands of the powerful House ways and means committee, and the outcome is far from certain.

Best guess at this point: About the most the industry can hope for is that the tax be reduced to 3½ cents.

Plenty of observers figure it will be kept at 4 cents—and they don't rule out the possibility of a hike to 4½ cents.

Chances are that a proposed big hike in truck fees will be modified somewhat and that there will be a compromise on the issue of using some automobile excise taxes or general revenue funds for road construction.

But the administration appears adamant that part, if not all, of the "temporary" 1-cent hike in gasoline tax be retained.

4. Minimum wages.

The current clash over the expansion of minimum-wage coverage is of particular importance to the marketing segment of the industry.

Marketers are not especially concerned over the possible increase in minimum wages. In a majority of cases, marketers already are paying their employes more than what is likely to be the new minimum.

What does concern them is the extended coverage which would make them liable for paying time-and-a-half overtime.

They point out that because of the seasonal nature of much of their work, their employes work long hours during some periods and short hours during others. Forcing the marketers to pay time-and-a-half for overtime would greatly increase their labor costs, they insist.

The battle scene has shifted to the Senate, now that the House has passed a watered-down version of the original wage bill.

It is considered likely that the Senate will restore part of the administration's objectives. If so, the final showdown will be when the Senate and House versions go to conference to settle differences.

5. Depletion.

As usual, the oil industry has to be on guard against a sudden foray by foes of oil's percentage-depletion provision.

Congress has been quiet on that subject this year, and may continue to be so. But proponents of a cut are known to be biding their time, awaiting an opportunity to attack again.

Recently, Sen. John J. Williams (R.-Del.) came out with a flat prediction that oil's depletion allowance will be whacked in the not-too-distant future.

Williams, a long-time critic of 27½% depletion, said he figured a cut of some kind would be made during the Kennedy tenure (OGJ, Feb. 6, p. 78).

There is virtually no possibility that a reduction will be attempted through normal channels. But there is always the chance that in the Senate there will be an attempt to tack a proposed reduction on some House-passed legislation which has nothing to do with oil.

If such a move occurs this year, it will be late in the session when the pressure is on to get legislation through the mill.

One reason for suspecting that an effort will be made this year is this: Advocates of a cut may want to put the new administration to a test on the issue—force Kennedy to commit himself.

6. Long-range outlook.

There will be other issues other than those outlined above, of course, but the outlook is that those will be the big five during the current session of Congress.

Right now the Kennedy administration is busy with the "hard sell"—seeking to establish for itself a favorable climate in Congress and with the general public.

It will, therefore, try to avoid major showdown issues as much as possible. And it will try especially to steer away from smaller issues that might create an undue amount of grief.

By next year, the pattern of Kennedy-backed legislation will probably be much clearer. And so will be the question of how much success the President can have with Congress.

Here's the Capitol Hill Outlook:

- **Fuels study.** Still up in the air, but has a better chance to be settled in current congressional session than most oil-related matters.
- **Gasoline tax.** Question of whether it will drop back to 3 cents as scheduled, stay at 4 cents, or even rise to 4.5 cents is far from settled.
- **Depletion.** Things have been quiet so far, but backers of a cut in the 27½% oil-depletion allowance are waiting for a chance to attack.
- **Regulatory agencies.** Administration is sure to recommend changes aimed at speeding up work of agencies, but congressional fight may develop over approach.
- **Minimum wages.** Senate may try to restore part of the administration objectives that got the ax in the House version of the wage bill, leading to a new showdown.

Rate-Base Data Cut From Area-Price Hearings

• FPC's elimination of rate-base, costof-service evidence will help smooth the way for progress in the latest conference on Permian basin prices. The cost question was a stumbling block at the initial talk in Midland.

THE FEDERAL Power Commission last week ruled out rate-base, cost-of-service evidence in area-price hearings.

The action cleared a major hurdle from the fate of this week's resumption in Washington of a pre-hearing conference on area prices in the Permian basin.

Observers felt the conference may now be able to make substantial headway in outlining the scope of area-price hearings, including a decision on what information is pertinent and what is not.

The initial conference in Midland last month had been adjourned to seek a commission ruling on the cost question.

In making the ruling, the FPC called attention to its statement in the Phillips case decision last fall when it said that "the traditional original - cost, prudent - investment rate-base method of regulating utilities is not a sensible, or even a workable method of fixing the rates of independent producers of natural gas."

It said that it felt producer prices should be based on reasonable financial requirements of the industry and not on the particular rate base and expenses of each natural-gas company.

Although ruling out cost-of-service evidence, the FPC said it would permit introduction of cost data to be used in determining financial requirements of the natural-gas industry.

The commission spelled out what it considers the difference between cost - of - service evidence and cost data.

Examples of information FPC considers relevant: Cost data relating to domestic search, production, and field-processing operations of producers in the Permian basin area. This would include all recurring direct and indirect financial requirements "that may reasonably be associated with these activities."

In effect, the proper use of cost data, as the commission now views it, is to help the FPC determine what the industry needs in revenues to provide adequate supplies of gas at reasonable prices.

Under the traditional cost-of-service rate-base method, price was based primarily on past individual costs, not future industry needs.

Under the broader approach it is now trying to use, the FPC wants cost information on a group basis rather than on a project or company basis. It also wants to develop standardized methods for supplying the cost data it needs so there will be uniformity in the cost information.

"The data must be compiled in a manner so as to set forth cost pertaining to operations in the Permian basin area," the FPC said. In addition, it wants company cost information to be used as a basis of comparison.

With the cost-of-service question now out of the way, an effort will be made at this week's conference in Washington to get agreement between all groups and the FPC on the required data and the form in which it will be presented.

Where no agreement can be reached, it may be that the staff will seek authorization to subpoena any data it feels is essential.

Although there is hope that the meeting will move farther and faster than the Midland meeting, there is no assurance that this will occur.

A smaller group will be present this time, but the same number of viewpoints will be presented. The FPC staff intends to hear everyone who wants to be heard, and will not seek to limit the subject range of the discussions.

The meeting will be closed and off the record. However, if any substantial agreements are reached, a formal pre-hearing conference will follow, perhaps immediately, to get the agreements on the record.

The next step would be the setting of a date for the area-price hearing itself. Such a hearing probably would not begin for several months for all parties would want time to prepare for it.

Aside from the problems that will be discussed this week, there is another complicating factor just over the horizon: The views of the new commissioners who are due to take office soon.

A Senate committee is holding hearings this week on the appointments of Joseph Swidler and Howard Morgan to the commission. And, in June the President will appoint another new man to replace Commissioner Arthur Kline.

So the big unanswered question is whether these new men will approve or disapprove of the area-pricing approach. If they disapprove, the current conferences will be wasted motion.

An FPC staff member pointed

Cost Study Started

INDEPENDENTS in the Permian basin have launched an area-wide study of costs aimed at developing ammunition for the April 12 FPC hearing in Washington.

The study is being made by the Permian Basin Independent Gas Producers Committee—a loosely knit producer group especially formed to present the Permian independent viewpoint in the area-gas-price question.

The data will be presented to FPC as a bob-tailed, cost-data sheet for small producers.

Committee members appear to strongly favor the area-price theory. But they feel the dual-price setup for so-called new and old gas is unfair and should be abandoned. Prices now fixed for the basin by FPC are 11 cents per M.c.f. for old gas and 16 cents for new.

out, however, that the staff has no choice but to proceed on its present course since it has no way of knowing what the future direction might be.

Military to Barter Surplus Commodities for Navy Fuel Oil

THE military is going to try a barter plan under which surplus U. S. agricultural commodities will be sent abroad in payment for oil purchases.

The test will be applied to the military's purchase of 6,200,000 bbl. of Navy Special fuel oil.

To launch the test, the military last week issued a request for proposals for that amount of Navy Special to be purchased under a barter arrangement for delivery to the eastern seaboard.

Before submitting a bid, a company must reach an agreement with the Commodity Credit Corporation setting out in detail the terms and conditions under which the surplus agricultural commodities will be acquired and disposed of.

Basically, this is what is involved: A company wishing to bid will have to agree to let the military make its payments to the CCC. In turn, the company will accept from the CCC a surplus agricultural commodity in payment.

The oil firm will then have to make arrangements to dispose of the surplus commodity abroad. This will no doubt be done through a broker, since oil companies would have no normal outlets for grain.

The government's purpose is twofold: To get rid of surplus commodities and to slow down the outflow of gold that results when the military pays cash abroad for its fuel supplies.

The Department of Navy selected Navy Special for the current test because historically this fuel has been offered primarily from overseas sources due to the shortage of the fuel on the East and Gulf coasts.

The barter plan is being eyed with considerable skepticism by many oil firms. However, it is understood that they have told the military they will make an effort to deal in this fashion.

watching WASHINGTON

Clyde La Motte

• Crude-import hearings will reopen old wounds . . .

REGARDLESS of the format of the upcoming hearings by Interior on crude-oil-import regulations, you may be sure that at least these four long-standing, controversial issues will be aired:

Should the over-all level of crude imports be reduced further, should inland refiners who don't use foreign crude continue to get quotas, should the share of "historical" importers be trimmed to make more room for others, and should something be done about the Oil Import Appeal Board?

Obviously, more heat than light is likely to be generated because several of these issues have been hashed and rehashed. However, the fact that we now have a different administration gives each side some hope that it can prove its case with the new officials.

When it's over, Interior Secretary Stewart L. Udall may rue the day he started these public hearings.

• Do inland refiners deserve a "windfall" quota . . .

THERE IS probably more bitterness over the quotas for inland refiners than over any other point of the control program.

Established importers seethe when they reflect that an inland refiner who hasn't the slightest intention of using foreign crude is eligible for a quota—a quota which he promptly "swaps" back to the importer at a net to himself of maybe $1 a barrel.

(The rules prohibit outright selling of quotas, but in some cases this is apparently being done anyway—thinly disguised by paperwork exchanges that are little more than gestures.)

Importers feel strongly that if a refiner can't or won't use quota oil in his own plant he should be required to turn back the quota.

Of course there is another side to this issue. Inland refiners feel they have as much right to a quota as anyone else—and that whether they use the oil in their plants or use it in a swap for domestic crude is their own business.

Also, from a defense and security standpoint, they can present a strong case on the need for a healthy inland-refinery segment of the industry.

• Import board: "Simply a rubber stamp deal" . . .

THE OTHER issue that stirs anger in some is concerned with past operations of the Oil Imports Appeal Board.

Company after company has gone before the board and virtually all have departed empty-handed.

This accent on the negative has caused many to conclude that decisions were made before cases were presented—that the board's hearings were mere formalities to provide a stamp of legality for administrative action already taken by Interior.

If this is so, the argument runs, the board should be disbanded or given authority to judge a case on its merit.

The other two issues—import levels and the status of "historical" importers—are the most important. However, they are confined to cool questions of judgment—the determination of proper adjustments.

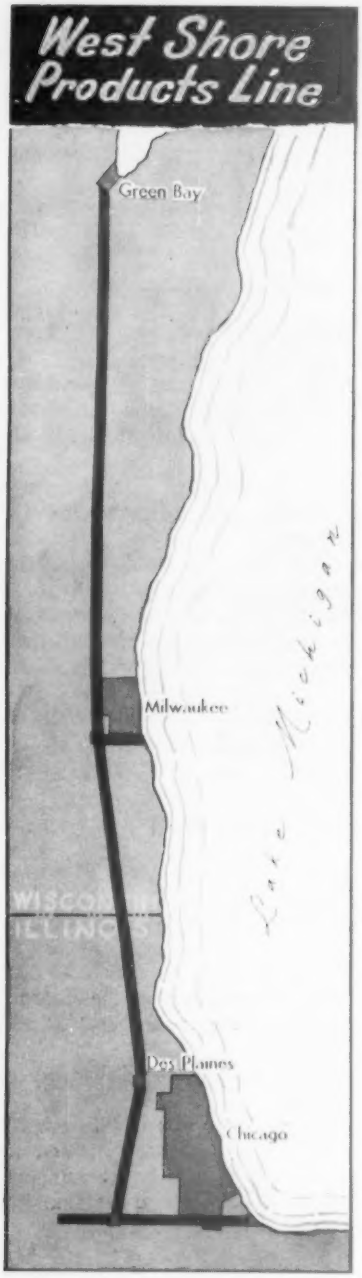
But the issues of inland quotas and the appeals board are smoking hot. Those who are aggrieved feel a total change is needed.

Work Set on West Shore Line

- **Construction of new pipeline for movement of products from Chicago to Wisconsin is due to get started in June.**

WORK on the West Shore pipeline, which will move products from Chicago refineries to Milwaukee and Green Bay, Wis., is expected to start in June.

Ten oil companies are backing the 285-mile system. Completion is scheduled by the end of the year.



Aim of the system is to cut transportation costs. The companies figure they can avoid excessive winter storage and end their dependence on uncertain tanker movements.

Initial capacity of the line will be about 75,000 bbl. daily.

The system will include a 16-in. line from Chicago to Milwaukee and a 10-in. line from Milwaukee to Green Bay.

A 16-in. lateral will deliver products to Jones Island, a Milwaukee lake terminal where several of the participating companies have storage.

Pure Oil and Interstate Oil Pipe Line Co. conceived the project. The others taking part are Mobil, Texaco, American, Shell, Ohio Oil, Cities Service, Continental, and Clark Oil & Refining (OGJ, Sept. 12, 1960, p. 81).

Officers and directors of West Shore Pipeline Co. will be elected April 12. West Shore offices have been set up at Des Plaines, Ill.

FPC will allow some escalation clauses in gas-sales pacts

THE Federal Power Commission has slightly modified an order which banned indefinite-pricing clauses in natural-gas producer sales contracts.

It will now permit inclusion of contract terms providing for price re-determination at stated intervals.

However, such re-determinations cannot be made oftener than once every 5 years. And the re-determined price would have to be approved by the FPC.

As the March 3 order was originally drawn, no indefinite - pricing clauses were permissible. Any rate increases during the life of the contract had to be specified at the outset.

This ruling drew sharp protests from producer groups who pointed out that it was impossible for either the seller or the buyer to foresee conditions throughout the life of a 20-year contract.

The use of indefinite - pricing clauses, they said, permits adjustments to be made as changing conditions require.

In its revision of the order, the commission insisted that indefinite-escalation provisions are generally contrary to public interest because they encourage price spirals.

However, the commission conceded that a complete ban of indefinite provisions might be too restrictive. So it settled on the restricted use of indefinite - pricing clauses.

Helium program off to good start with big plants slated

A FEDERAL conservation program keyed to the purchase of helium from private industry is picking up speed.

Soon after Interior Secretary Stewart L. Udall announced that contract negotiations with four companies would get under way, Panhandle Eastern Pipe Line Co. said it is considering a $50-million helium-extraction plant in the Hugoton gas field.

Panhandle Eastern is one of the firms named by Udall. The others are Cities Service Helium, Inc., New York; Helium Conservation Corp., Midland, Tex.; and Northern Natural Gas Co., Omaha.

Udall said these four were chosen from 14 companies that submitted proposals for taking part in the conservation program. He said more than half of the helium the Government expects to buy could be obtained from plants that would be built by the four companies.

In announcing plans for the Hugoton installation, Frederick H. Robinson, senior vice president of Panhandle Eastern, said no site had been determined. However, he said, such a plant would be constructed in an area where Panhandle Eastern is both a producer and big buyer of natural gas.

Helium Conservation plans a $3,000,000 helium-extraction plant, near White Deer in the Panhandle, with a gas-processing capacity of 50,000,000 cu. ft. daily. The gas would come from a 63,000-acre spread of leases in the area.

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Ocean Drilling Passes First Test

• Global Marine drills core hole in 11,700 ft. of water and claims it can drill a wildcat well at same depth. This would permit exploration almost anywhere in the world and would eliminate deepwater drilling barriers.

THE OLD bugaboo that an oil prospect can't be drilled in the deep waters off the continental shelf has been shattered by the successful drilling carried out as part of the Mohole project.

Oil men have been going into deeper and deeper waters as the search for oil moves farther offshore. Now it appears that nearly any oil prospect in the world can be drilled.

This assumption is based on the core drilling under way off Baja California, near Guadalupe Island, in 11,700 ft. of water. The depth is 32 times greater than that at any previous drilling location.

Although the Guadalupe operation is a coring project, drilling in this depth can be repeated as a conventional wildcat - drilling program, according to Robert F. Bauer, president of Global Marine Exploration Co., contractors on the job.

This means seven-eighths of the world is open to oil exploration. For all practical purposes, this is much more than would ever be tackled by wildcatters. But it does emphasize the drilling range which is possible.

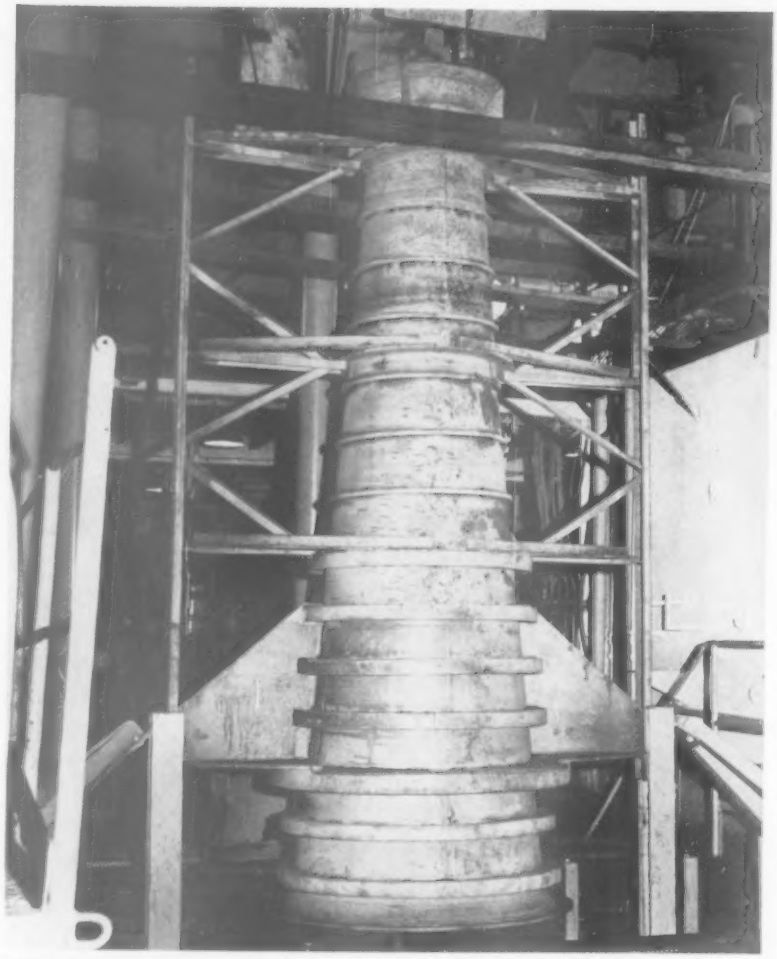
Some modifications of the Guadalupe drilling would be needed before an operator could move into water several thousand feet deep, but Bauer says these are feasible.

The Guadalupe wells are being drilled as uncased holes, with salt water being used as drilling fluid. However, Bauer says that wells can be drilled in water this deep as cased holes using drilling mud.

More to come . . . The coring near Guadalupe is expected to be wrapped up this week or next.

While the test drilling has confirmed that wells can be drilled in ultradeep water, some more drilling news will be generated when the actual Mohole is drilled.

Expectations are that it will take 2 years to pick a site and to develop special equipment to handle the Mohole, which aims at piercing the earth's crust and going to something like 15,000 ft. below the ocean floor.



GUIDE SHOE which fits under the rotary table protects the top of the drill string in the Mohole-style operation. The guide shoe, 35 ft. long, is shaped like a funnel with a 10-in. diameter at the top and 58-in. diameter at the bottom.

More drilling like the Guadalupe operation probably will be done before a final location is selected. Then the Mohole will be tackled.

The site probably will be in water from 12,000 to 15,000 ft. deep, so the total depth of the Mohole will be somewhere between 27,700 and 30,000 ft. deep.

Some of the innovations planned for the Mohole operation are:

. . . **A new drilling ship** will have to be built to handle the job. Scientists directing the program are thinking now of converting a floating Navy dry dock to a drill ship. The dry dock would be big enough to handle all of the drill pipe and other equipment needed for such a deep hole.

. . . **The drill string** may be a combination of aluminum and steel pipe to cut down weight. No definite program has been adopted, but the

Mohole planners are looking closely at aluminum drill pipe with the idea of using alternate joints of aluminum and steel. The Guadalupe wells are being drilled with 4½-in. steel pipe. Two grades and three weights of pipe make up the string.

. . . **Some technique** of changing bits must be developed. The Guadalupe wells are one-bit affairs. The Mohole will be too deep for a single bit, so round trips will be necessary.

Guadalupe holes . . . The Guadalupe drilling has racked up a number of drilling and scientific "firsts."

The principal drilling achievement, of course, is the success at such a depth. But this also is the first time an unmoored ship has been used to drill in deep water and inaugurates some of the special equipment designed for the Mohole. The drill ship is held in position by four outboard motors, two forward and two aft.

Bauer says there have been a minimum of drilling woes. No stress problems have cropped up that weren't expected. Apparently a special guide shoe under the rotary table has eliminated the danger of the string snapping at the top because of tension from the weight of the pipe or from movement of the ship.

Global Marine's CUSS I drilled the first Guadalupe hole in seas with 12-ft. waves and 25 mph. winds. This approaches the limit for rough weather since a 30 mph. wind is the critical point for moving off the hole.

Four holes will be drilled at Guadalupe, with the deepest going to 1,500 ft.

On the first hole, two cores were taken—one at 110 ft. and another at 234 ft., the end of the hole. The first core was 53 cm. long and the second 60 cm. The wire line on the special core barrel broke when the first core was taken, but it was fished out of the hole on the first try.

It took about 70 hours to drill the first hole. About 8 hours of the drilling time were spent in hanging the 11,700 ft. of pipe to the ocean floor.

Some time also was consumed in landing a drilling base and other surface equipment on the ocean floor. The hexagonal base, roughly 6 ft. in diameter, was attached to the first joint of drill pipe together with about 100 ft. of surface casing and a special tapered joint of surface casing in which the drill pipe fits. The tapered casing sticks up 40 ft. above the landing base and absorbs some of the vibrations from the drill string.

The casing and landing base are attached to the drill pipe with a J-slot device and the casing is actually drilled into the ocean floor. Once the base is set on the floor, the J-slot is unlocked and the drill pipe is free to turn the bit.

The Guadalupe drilling climaxes months of planning by various oil representatives and by a committee of the National Academy of Sciences-National Research Council. The committee is directing the Mohole project under grants from the National Science Foundation, an independent government agency.

Gordon Lill, committee chairman, says that scientifically the "expedition has paid off."

The coring at 234 ft. was four times that of any previous coring under the ocean floor, and the committee plans to core and log to 1,500 ft. on the deepest of the four tests.

To illustrate the advances in deepwater drilling, Bauer points out that only about 4 years have passed since the CUSS I created a stir in the oil industry by drilling with 4½-in. pipe in 360 ft. of water.

Global Marine has drilled with 2½-in. drill tubing in water 1,500 ft. deep, but 360 ft. was the deepest water for a 4½-in. hole—until the Guadalupe drilling started.

The oil men who helped plan the drilling came from throughout the oil patch. Help was given by a number of equipment manufacturers (OGJ, Mar. 27, p. 72).

INDUSTRY BRIEFS . . .

A contract to buy oil and gas production in eight South Texas counties has been made by Lone Star Producing Co., Dallas. The deal concluded with R. L. Kirkwood, San Antonio, includes working, royalty, and overriding royalty interests in 101 oil wells and 21 gas wells in Atascosa, Live Oak, Goliad, DeWitt, Duval, Webb, Refugio, and Bee counties. Consideration was an undisclosed amount of cash.

All capital stock of Larcon Oil Co. has been bought by Landa Oil, Dallas. The latter will take over oil-producing properties and operate Larcon as a subsidiary with a division office in Magnolia, Ark. The transaction for an undisclosed sum gives Landa interests in 80 wells in Union, Lafayette, Nevada, and Miller counties in Arkansas.

The highest state gasoline tax in the nation—7.5 cents a gallon—is in effect in Washington. Gov. Albert D. Rosellini signed into law a measure which raised the state tax by 1 cent as of April 1.

Sale of Calvert Petroleum, Oklahoma City, to Continental, Oilwell Supply, and Calvert Exploration for $11,498,398 has been concluded. Calvert Exploration is a new corporation set up by most of Calvert Petroleum's officials. A contract-drilling operation, its headquarters will be in Tulsa.

Expansion of the Redfield, Iowa, underground storage field is planned by Northern Natural Gas. The company has amended a previously filed FPC application to ask for withdrawals of 95 million cubic feet per day instead of 40 million cubic feet from the Mount Simon reservoir, and to ask for authority to build a 1,500-hp. compressor unit at Redfield. It would increase inventory of gas in the Mount Simon from 45 billion to 56 billion cubic feet. The expansion would bring total withdrawals from two reservoirs in the field to 195 million cubic feet daily.

Merger of Permian Corp., Midland, Tex., and Dakamont Exploration, Denver, is up for approval by stockholders of both marketing companies. Agreement would be made on basis of one share of Permian for 31.6 shares of Dakamont. Dakamont would become a division of Permian.

Natural-Gas Fuel Cells May Supply Home Power

• Researchers say prospects are good in a hunt for a fuel-cell power pack capable of generating cheap electricity for dwellings. Success of such a device would open up a tremendous new market for natural gas.

PROSPECTS for a natural-gas-based fuel cell are encouraging, according to a research team at Chicago's Institute of Gas Technology.

"If natural gas can be used as the energy source, fuel-cell power packs may be economic for supplying all or most of the electricity requirements of a home," the team reported last week.

Sponsored by the American Gas Association, the IGT work is directed mainly toward development of fuel-cell power packs for dwellings.

The project is among 60 on which government and industry are spending millions of dollars annually. But AGA's is one of the most determined efforts being made to develop a commercial unit for converting chemical energy directly to electrical energy.

Success would not only open up a vast new market for natural gas. It would also provide an effective counter measure to electricity's drive for a larger share of the nation's space-heating business.

Fuel-cell economics . . . Reporting to the AGA Research and Utilization Conference in Cleveland, the IGT group analyzed the prospects for use of natural gas in fuel cells.

Pointing out that in many parts of the country a unit of energy in the form of gas costs only one-sixth to one-eighth as much as a unit of energy in the form of electricity, the scientists said:

"It seems likely that this basic cost advantage will be large enough to offset the unavoidable additional costs in converting energy to electricity in a multiplicity of small installations."

This should be possible, they said, because of the relatively high efficiency of low-unit-cost, small-fuel-cell systems.

Possible approaches . . . There are five approaches to the natural-gas home-power pack that can be demonstrated with current technology, the IGT group said.

Natural gas (methane) can be used directly in a high-temperature cell if steam is present. Dry methane does not react.

Two types of electrolytes have been shown to work at 600° F. or higher—molten carbonate mixtures and solid ionic oxides. Since a large body of information is already available on molten carbonate cells, this approach is seen as a good candidate for development of a natural-gas appliance.

But molten carbonates are corrosive and have low viscosities, causing problems which in theory would not occur in solid oxides cells. More information is needed on the latter approach.

There are three indirect approaches using hydroxide cells at low and intermediate temperatures. But these are considered less promising now than either molten carbonates or solid oxides.

Best candidate . . . Highly attractive as a research and development venture, in the opinion of IGT scientists, is the direct use of methane plus steam in a high-temperature cell.

In this type of cell, methane is converted to hydrogen by steam reforming. A current is generated by electrochemical oxidation of hydrogen. The oxygen source is either the carbonate or the solid oxide, depending on which electrolyte is used.

In a power pack for home installation, steam would be added to the natural-gas. Flue gas as a source of carbon dioxide would be added to the air feed in the case of a carbonate cell.

Underfiring with waste gas from the cells would compensate for normal heat losses. Heat requirements for the reforming reaction itself are about equal to the heat release due to cell inefficiencies.

There are several possibilities for using the waste heat from fuel cells in conventional home appliances.

Because of the wide variation in home electrical demand, studies indicate it probably would not be economical to design a power pack to meet peak loads.

Storage batteries would likely be used to raise the load factor and to smooth the power demand. This would permit fuel cells to operate continuously.

Instead of providing a large power pack to meet peak loads of around 10 kw., a 1-kw. unit operating continuously with a storage battery might be the right balance. The storage battery's cost would be less than that of the fuel-cell capacity it supplanted.

Thus the IGT scientists lean toward the high-temperature fuel-cell approach, integrated with waste-heat utilization and an electrical storage-battery system.

Molten carbonate cells can be used at first, since more is known about their behavior. Then solid oxide cells can take over if research bears out their theoretical advantages.

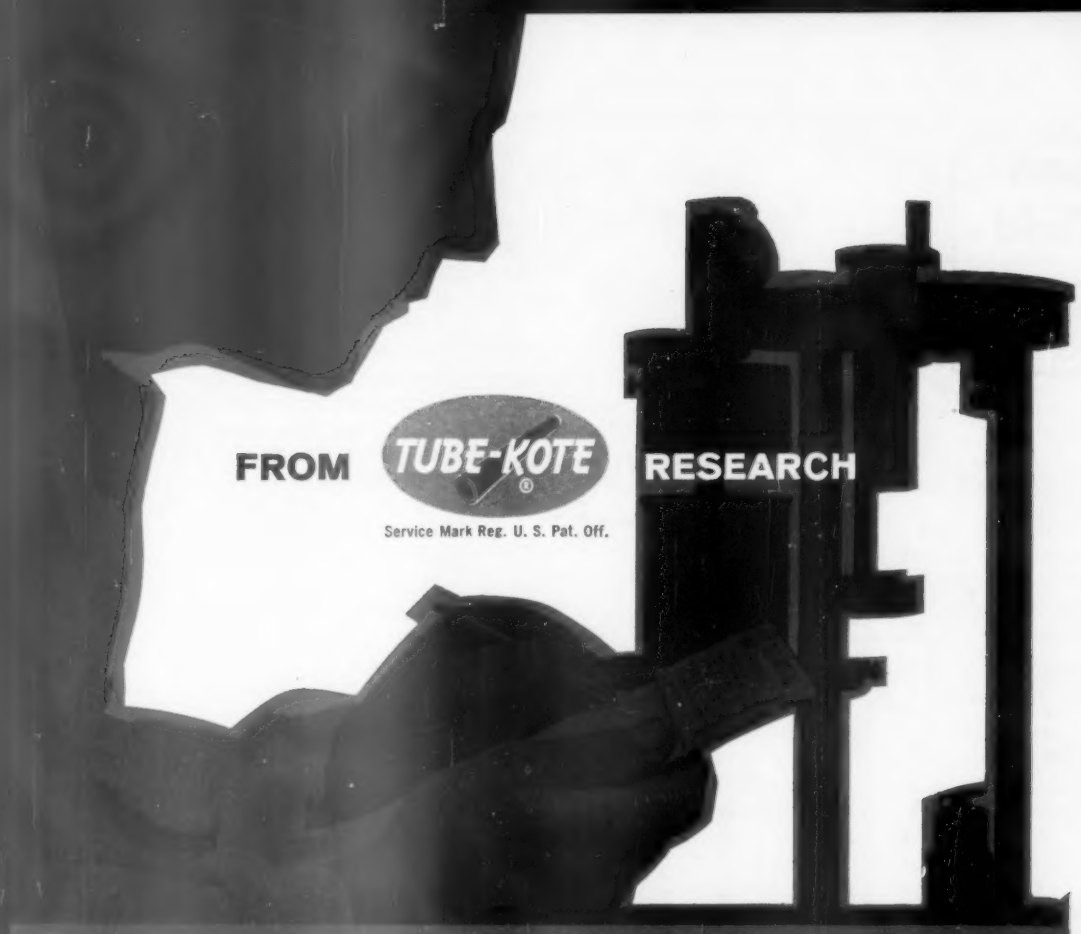
Current work . . . A six-cell carbonate research battery was built and tested last year.

This year a five-point program is under way.

With molten carbonate cells, single-cell tests will be conducted to develop better electrodes and electrolyte-preparation methods. A 100-watt prototype battery will then be built.

With solid oxide cells, techniques for preparing the necessary ultra-thin films will be studied. Single-cell tests will be conducted to evaluate cell components and the effects of variables.

Also, the search for promising solid oxide electrolytes will continue. Engineering and economic studies also are planned in order to develop estimates of manufacturing and other costs.



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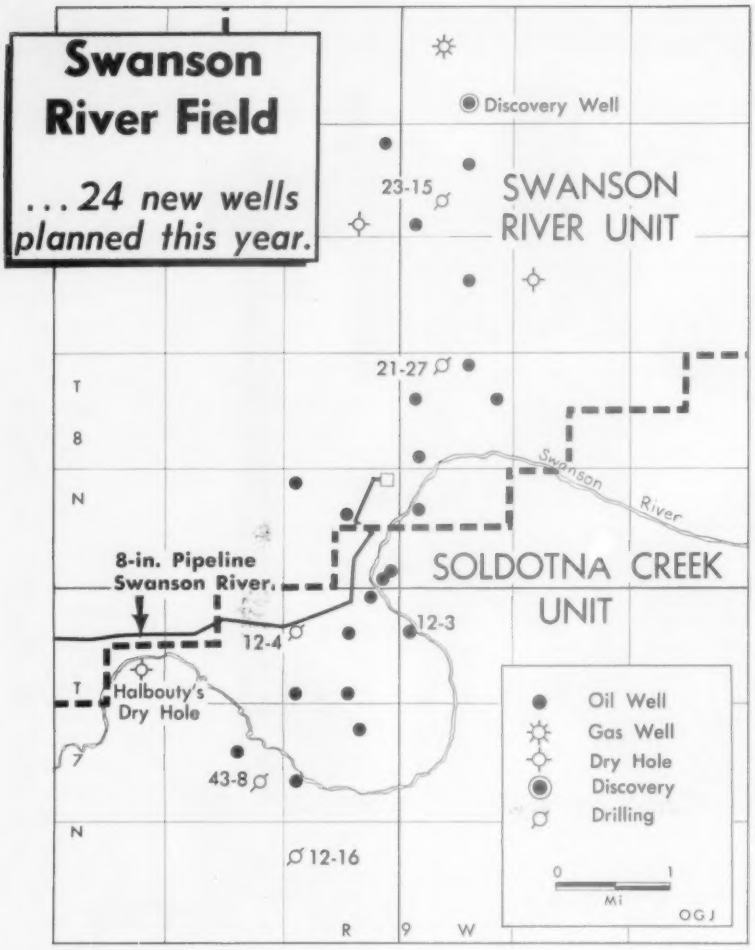

New Field to Double in Size

- Six rigs are working in the Alaskan field. The number of completed wells is to be pushed to 45 this year.

ALASKA'S Swanson River field will grow into a sizable oil field by the end of 1961.

A development program mapped for the Kenai Peninsula field shows:

... **Number of wells** is expected to reach 45 producers, slightly more than twice the present 21 producing wells.

... **Production** will go up steadily during the year. Currently the field is making 10,000 bbl. daily from the 21 wells. This should be near 20,000 bbl. by the end of the year.

... **Pipeline capacity** for the 8-in. crude line running from the field to Cook Inlet will be stepped up to 30,000 bbl. daily by adding a 175-hp. pump at the Soldotna Creek pumping station. The 22-mile line went on stream last summer with a capacity of 10,000 bbl. daily.

... **Storage capacity** at the Nikiski terminal will almost be doubled this year. A 200,000-bbl. tank will be built at the tank farm, which now has two 132,000-bbl. tanks.

The drilling program planned this year in Swanson River should determine just how good a field Richfield Oil Corp. discovered in July 1957. Richfield and Standard Oil Co. of California are the two big owners in the field, with Socal serving as operator.

Based on present plans, the field ultimately will have about 55 producing wells. But this number likely will change, depending on the success of the stepout wells programed this year.

Too, the spacing pattern may be altered. The field is being developed on 160-acre spacing.

Six rigs are running in Swanson River, which is split into two pools—Swanson River unit pool and Soldotna Creek unit pool. Most of the drilling in recent months has been done in Soldotna Creek, where four rigs are running now.

One of the Soldotna wells is the most southerly in the field. This is the 12-16, which is drilling below 8,400 ft. It will go to between 10,000 and 12,000 ft., where the Hemlock sand is found.

Three contractors are working for Socal in the field. They are Coastal Drilling Co., Bakersfield; Reading & Bates Drilling Co., Tulsa; and Rowan Drilling Co., Fort Worth.

Other drilling . . . Two important wildcats are drilling in Alaska.

One is the 1 Falls Creek, also a Socal and Richfield well. The Falls Creek wildcat is being whipstocked from an onshore location out into Cook Inlet. Last week the well was drilling ahead at 12,910 ft., which is near the target depth. The wildcat is about 50 miles southwest of Swanson River field.

Pan American Petroleum Corp. recently spudded the 1 Napatuk Creek in the Bethel basin.

These two wildcats and the six wells in Swanson River are the only active locations in Alaska.

Standard of California has programed another rank wildcat somewhere in Alaska this year, but the company has not revealed just where the well will be drilled. There have been reports that it will be spotted east of Swanson River, but the company has not confirmed this.

Sizable gas reserves have been found at three spots on the Kenai during the past year, but further development of these awaits a market. Union Oil Co. and Ohio Oil Co. plan to sell some of their gas in Anchorage when a pipeline is completed, but all the gas wells currently are shut in.

Alaska Pipeline Co. is installing the line. It will make another attempt this spring to lay a 12-in. line across Turnagain Arm, the one unfinished link in the 74-mile system.

Ultradeep Louisiana Well Has Oil Shows

JOHN W. Mecom's ultradeep test in South Louisiana has had some oil shows on its way to a possible world's depth record.

The drillers for U. S. Oil of Louisiana, a Mecom company, were below 18,923 ft. last week and were staying on schedule with their drilling plans.

The hole has 10¾-in. casing to 13,023 ft. Mecom plans to go to some 22,000 ft. or more before running 8⅝-in. liner. If necessary, the company is prepared to drill to a record 26,000 ft. (OGJ, Jan. 30, p. 88).

Mecom has released no information on what the drillers have found but it was learned that shows occurred around 16,000 to 17,000 ft.

Commercial Scouting Offered on Gulf

THREE contract-scouting organizations are offering major oil companies well information on the Gulf Coast, East Texas, and southeastern states.

The service would be similar to that now offered in other areas of the oil country (OGJ, July 4, 1960, p. 63).

Several companies confirmed last week that they have been approached. Four companies have reportedly made commitments to one of the organizations.

One company spokesman says it seems "inevitable" that some form of commercial scouting will move into the area.

However, another says that if the majors subscribe to such a service they will consider it supplementary and will continue to use their own scouts.

The organizations bidding for the Gulf Coast and East Texas business are Data, Inc., Tulsa, Rinehart Oil News Co., Dallas; and Petroleum Information Corp., Denver, which operates Well Record Service.

Pan American, Shell, and Ohio have formed a committee to make a special study of these services.

The committee is informal and unofficial. Its members will report on what advantages could be expected from subscribing to a commercial scouting service.

Much of the discussion at present revolves around a scouting service in Texas. But eventually it would embrace Louisiana.

At least 20 companies in Houston have been contacted.

It appears that within the next month some companies will be making decisions on whether to subscribe to a service.

Esso Plans Big Lube Plant

THE LARGEST lubricating-oil plant in continental Europe will be built jointly by Esso Standard of Italy and Raffineria Sicilana Olii Minerali (RASIOM), an Italian refining company.

The plant will produce 200,000 tons per year of high quality solvent extracted lubricants, including a full range of automotive and industrial lubricants and process oils.

It will be built at Augusta, Sicily, where RASIOM has a 100,000-bbl. refinery. Operation is expected to start in 1963.

The plant is being designed by Esso Research & Engineering Co., and will incorporate some new processes.

About half of the output will be distributed in the Italian market. The remainder will be exported to other Jersey Standard affiliates.

PROCESSING BRIEFS . . .

A new gas-processing plant with 25,000 M.c.f.d. capacity has been put on stream in the X-Ray field, Erath County, Texas, by Phillips Petroleum Co. The plant will produce a total of 50,000 gal. per day of propane, butane, and natural gasoline.

New catalytic reforming facilities are being built at Phillips Petroleum Co.'s Great Falls, Mont., refinery. The modernization program will also include facilities for catalytic hydrogen treatment of distillates and other revisions for increasing refinery crude-oil capacity.

Sulfur-recovery facilities to be built at the Petrogas plant near Calgary, Alta. (OGJ, April 3, p. 104) will be operated by Jefferson Lake Petrochemicals, Ltd. When the plant is completed in December, it is expected to produce 863 long tons of sulfur per day.

Oxo alcohols will be manufactured in the new Chocolate Bayou, Tex., petrochemical complex, Monsanto recently announced. The alcohol unit will use a Monsanto-developed process and should be on stream in late 1962.

A gas-processing plant to handle 100,000 M.c.f.d. of natural gas from the Harmattan-Elkton field near Didsbury, Alta., is planned by Canadian Superior Oil of California. Liquid production of 4,700 bbl. daily of stabilized condensate is planned. Work is to get under way in June or July and operation will begin by January 1962.

A gas-processing plant in Azalea field, Midland County, Texas, is now on stream. This 15,000-M.c.f.d. plant was built by Warren Petroleum and Odessa Natural Gasoline at a cost of $1,400,000. It is processing 13,000 M.c.f.d. of gas with a liquid recovery of almost 1,000 bbl. per day. Residue gas goes to El Paso Natural Gas Product Co.'s petrochemical complex at Odessa for fuel.

LPG extraction from gilsonite is planned at American Gilsonite's refinery near Grand Junction, Colo. New facilities, to cost $300,000, will extract about 325 bbl. per day of product, mostly propane with some butane.

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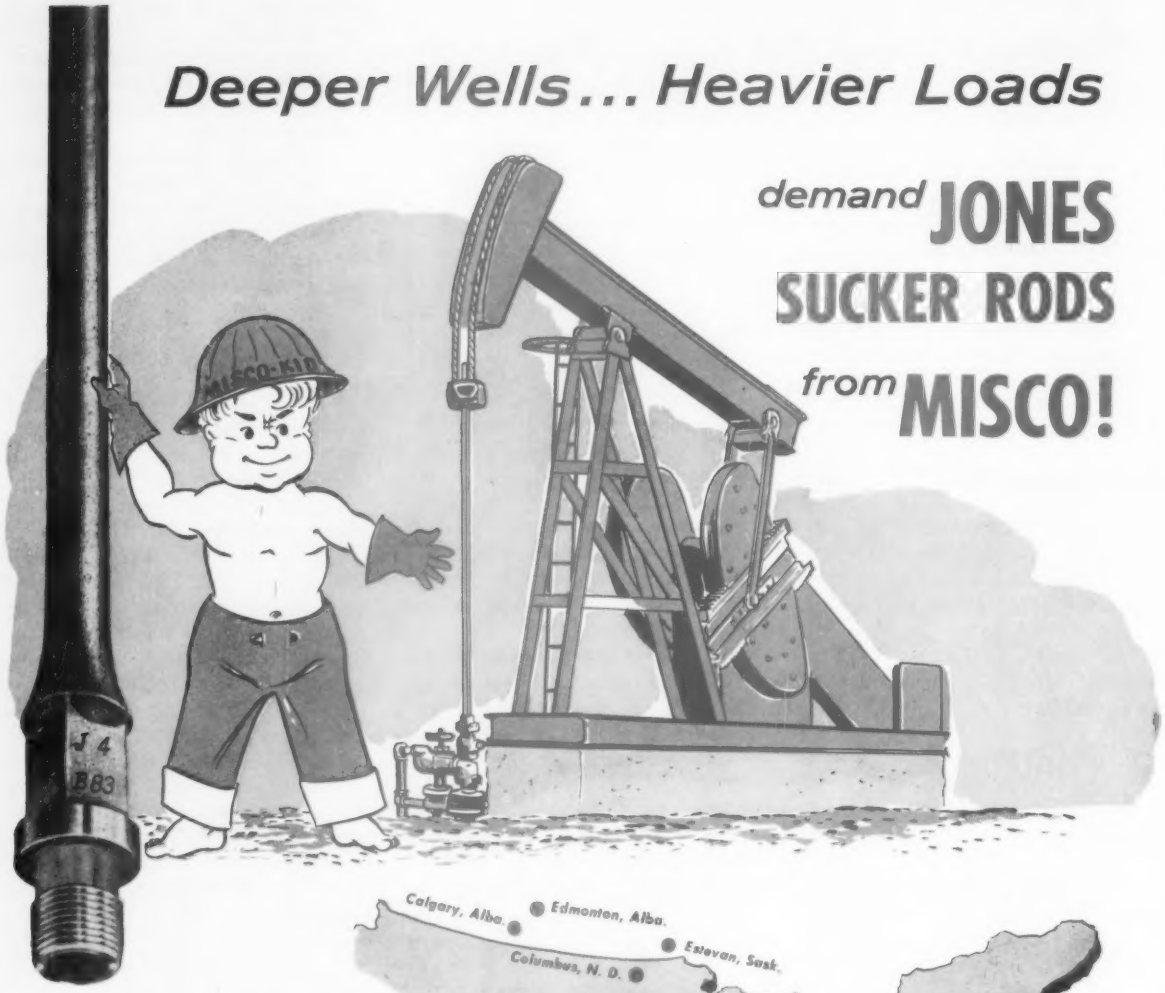

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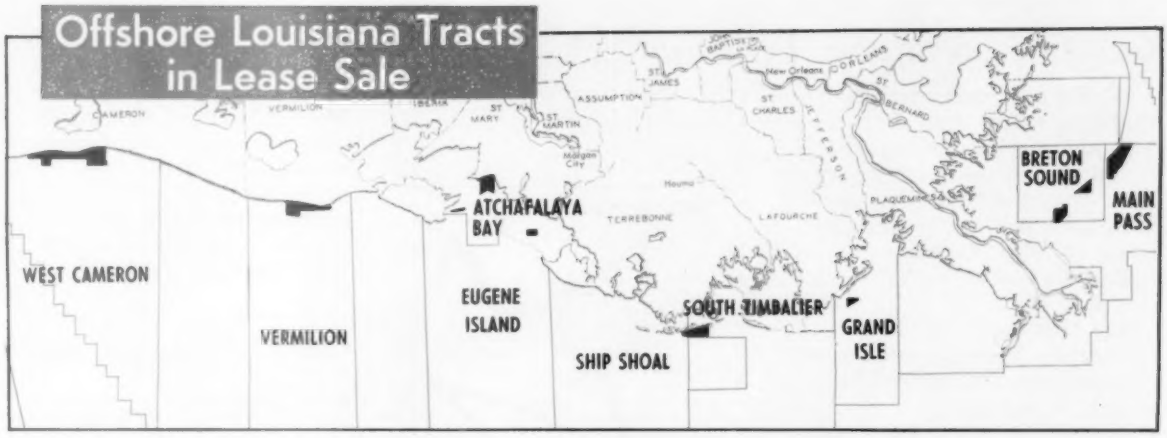


Louisiana Offers Mixture of Old and New Leases

WHEN OPERATORS bid on 42 offshore Louisiana tracts April 20, they'll be asking for lots of acreage which has been under lease before.

However, not all of the 116,000 offshore acres in this first Louisiana lease sale of 1961 should be consigned to the cast-off category.

There are big fields and current drilling near some of the tracts. And six tracts in the Main Pass area have never been leased.

Altogether, the lease sale will cover 175 tracts totaling 230,000 acres. No federal acreage is involved.

Interest in offshore tracts usually is far greater than interest in inland tracts.

All of the offshore tracts up for lease are in the state-controlled Zone 1 and in the Atchafalaya Bay area.

The offshore tracts were placed in the sale at the request of a company or individual. However, the State Mineral Board, which conducts the sale, designated four of the Atchafalaya Bay tracts because there were overlapping requests from companies.

The sale will be held at 10 a.m. in the board's office in the Oil & Gas Building at Baton Rouge.

The tracts . . . The 42 offshore tracts are bunched into seven general areas stretching nearly the entire length of Louisiana.

The lineup:

. . . West Cameron. Thirteen tracts are situated generally along the northern boundary of Zone 1 in the West Cameron area.

The Block 45 field lies south of the western end of this group, and Block 40 field lies south of the group's center.

. . . Vermilion. Five tracts are located along the north-central edge of Vermilion area. Just below them is the Block 26 field.

. . . Atchafalaya Bay. Six tracts in three groups are located in the highly productive Atchafalaya Bay area.

Four are near the shoreline and are flanked by fields on all sides—Bayou Sale on the north, Belle Isle on the east, Lake Sand and East Lake Sand, on the west, and Rabbit Island on the southwest.

One tract is in the southern portion of the bay, just north of Eugene Island's Blocks 15 and 16. It is just south of a recent discovery.

The sixth tract is a sliver of 247.6 acres just north of Eugene Island's Blocks 3 and 4. Humble Oil & Refining Co. asked that it be placed in the sale.

. . . Ship Shoal-South Timbalier. The California Co. asked that four contiguous tracts in Ship Shoal and South Timbalier areas be placed in the sale. The Lake Pelto field is on the northeast.

. . . Grand Isle. Hunt Oil Co. asked that the northwestern half of Block 24, Grand Isle area, be offered for leasing. The 2,365 acres, never before drilled, are just east of current drilling by Hunt. The tract is northeast of the Bay Marchand field. It is northwest of Humble's huge Grand Isle Block 16 field.

. . . Breton Sound. Seven tracts, in two groups, are located in the Breton Sound area.

Union Oil Co. of California nominated four of the tracts in the south-central portion of the area. The Block 45 field is on the north and west. Fields are also in Main Pass Blocks 46 and 47 to the south.

Kerr-McGee Oil Industries, Inc., nominated the other three in the east-central portion of Breton Sound area. They are just southeast of Kerr-McGee's Block 20 field.

. . . Main Pass. The six tracts in the Main Pass area which have never been leased were nominated by Union of California. They are northeast of those nominated by Kerr-McGee. There is no production nearby.

In addition to the offshore acreage the sale will include six tracts in White Lake, north of the Vermilion area, covering 9,700 acres.

Small-Tract Bill Studied

TEXAS' small-tract drilling fracas went from the courts to the legislature last week.

The house oil, gas, and mining committee opened hearings on a bill which would put a floor under gas-well allowables, wherein the allocation formula must be based at least one-third on the well.

The legislative action follows a landmark decision by the Texas Supreme Court in the Normanna field case which struck down the Railroad Commission's standard one-third well, two-thirds acreage formula for gas fields with small-tract wells (OGJ, Mar. 13, p. 100).

Gasoline Inventories Hit New Peak

GASOLINE stocks held in the Gulf-East Coast districts show a 4% gain over the previous all-time record for inventories set in 1959.

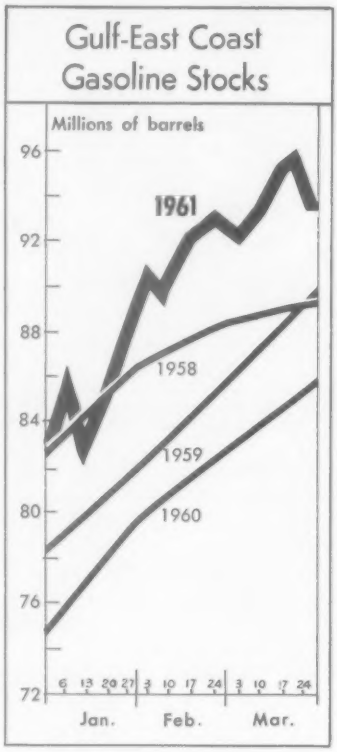
At the end of March they totaled 93,651,000 bbl., representing an increase of 7,624,000 bbl. over total held at the end of the first quarter last year.

The Gulf-East Coast inventories of gasoline, luckily, are running counter to the general trend for the country as a whole. The total industry gasoline stocks show a gain of only 854,000 bbl. over last year.

Part of the Gulf-East Coast gain is due to the relatively low stock position at this time a year ago. For the entire first quarter last year stocks in the two districts were below totals reported for both 1959 and 1958. The big buildup came in the last half of 1960.

The normal gasoline-stock pattern for these districts shows steady drops until sometime in October. But last year gasoline stocks increased in July, dropped only slightly in August, and then started a steady upward climb which continued through the first quarter of 1961.

Stocks would have been more out of line at the end of March except for a sharp correction in refinery runs in the last week of the quarter.



Waterton Gas Field's a Giant

ONE OF CANADA'S largest gas fields is shaping up in the Waterton area of southwestern Alberta near Pincher Creek.

Recoverable reserves of raw gas are estimated at 1.5 trillion cubic feet by Shell Oil Co. of Canada, Ltd., major producer in the area and scheduled operator of a gas-processing plant which will be built this summer.

After processing, disposable reserves of residue gas of pipeline quality are estimated at 1.01 trillion cubic feet.

This puts the Waterton area in a class with Calgary, Cessford, Harmattan-Elkton, Medicine Hat, Pincher Creek, and Westrose South, all Alberta fields with reserves exceeding a trillion cubic feet.

Shell has a 25-year contract with Alberta & Southern Gas Co. to sell an average of 110 million cubic feet daily for transmission through a 36-in. line to California. The pipeline is scheduled to go on stream late this year or early in 1962.

A Shell application before the Alberta Oil and Gas Conservation Board calls for a processing plant of sufficient capacity to produce peak market requirements of 120 million cubic feet daily.

A gas-gathering system has been designed for 192 million cubic feet daily and a liquids line with capacity of 9,600 bbl. daily.

Gas will be taken from the following pools—Waterton Livingston, Sheets III, IV, and IVA, Carbondale Devonian, Gladstone Creek Mount Head, and Castle River Livingston, Mount Head and Devonian.

The Waterton and Carbondale pools will supply 95 million cubic feet daily and the Castle River and Gladstone Creek pools will supply 15 million cubic feet daily.

The sour, wet feed gas for the Waterton plant will be about 22.3% sulfur. The plant—with absorption, treating, dehydration, and sulfur-conversion facilities—is designed to produce 119 million cubic feet of dry gas, 7,780 bbl. of liquids, and 1,413 long tons of sulfur daily.

Quake damages wells in California's Wilmington field

A DEEP-SEATED earthquake at Long Beach damaged at least 38 wells in Wilmington field last week.

The wells are in Blocks 1, 2, and 3 of the Terminal Island section of the 2,600-well field. They are on properties operated by Union Pacific Railroad Co., Atlantic Oil Co., and Long Beach Oil Development Co.

Damage is expected to be more extensive since the 38-well count includes only those wells where the rods were trapped and production stopped. Other wells probably received less severe damage. There are about 700 wells in this section of the field.

No surface damage resulted from the quake, which centered about 10 miles beneath the harbor area.

M. D. Hughes, subsidence and petroleum director for the harbor, said only one water injection well was damaged by the quake. The 37 producing wells were making about 1,000 bbl. daily.

Hughes said damage in the injection well indicates the slippage occurred at above 2,200 ft. The injector was pumping water into the tar zone, which is found at 2,200 ft.

The well started taking more water, indicating the casing sheared off above the zone.

Hughes said it is too early to determine if the wells can be redrilled or will be abandoned. He estimated it will cost at least $2 million to redrill the 38 wells.

Earthquake damage is an old story in Wilmington.

The most extensive damage was in 1949 when 302 wells were sheared. Quakes also damaged wells in 1947 (105), and 1951 (134).

New HDA Process to Get First Use in Argentine Plant

A NEW Argentine gasoline and benzene plant will be the first installation of a new hydrodealkylation process developed by Hydrocarbon Research and Atlantic Refining Co.

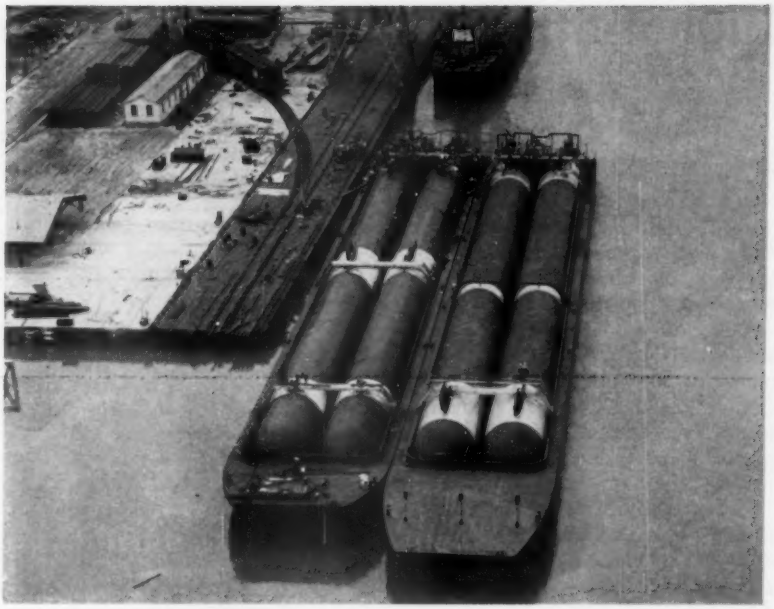
The $15-million unit will be built for YPF at San Lorenzo, about 200 miles northwest of Buenos Aires. Naphtha feed stocks will come from YPF facilities at San Lorenzo and Campo Duran.

The plant will have an initial capacity of 8,000 to 11,000 bbl. daily of high-octane gasoline, and about 700 bbl. daily of benzene. The benzene capacity can be expanded later to 1,200 bbl. daily.

The hydrodealkylation unit using the HDA process is a thermal process for converting toluene into benzene by dealkylation, or taking off the side chain. No catalyst is required in the conversion (OGJ, Mar. 6, p. 80).

In addition to the HDA unit, the new facilities will include an aromatics extraction unit and a catalytic reformer. Charge to the catalytic reformer will be up to 12,000 bbl. daily of naphtha feed stock.

Hydrocarbon Research will design and construct the plant in cooperation with Minera Alumnine, Buenos Aires.



Huge Petrochem Barges Ready

THE INDUSTRY'S largest petrochemical barges are ready to start moving refrigerated propane-ammonia for Phillips Petroleum Co.

Avondale Shipyards, New Orleans, built the barges to be moved in tandem or independently. Their record lengths—305 ft. and 284 ft.—will not prevent their movement along the intracoastal canal.

Each barge will carry 1,700 tons of anhydrous ammonia, refrigerated to −28° F. Each has two cargo tanks, 242 ft. 6 in. in length and 16 ft. in outside diameter.

The barges shown above at Avondale's docks, are 44 ft. wide and 12 ft., 6 in. deep.

Avondale fabricated special 7/16-in. low-temperature steel for the tanks.

The refrigeration equipment has automatic controls, and standby refrigeration is available in case of failure.

PIPELINE BRIEFS . . .

Merger of El Paso Natural Gas and Pacific Northwest Pipeline has been approved by a federal appeals court in Washington, D. C. The ruling upheld action taken by the FPC, and indirectly slapped at a Justice Department attempt to block the merger. The Justice Department contended the merger would reduce competition in California gas markets and trim possible markets for gas producers. It still has a case against the merger pending in a federal court in Salt Lake City.

The 67-mile Savanna Creek gas-gathering system of Saratoga Processing Co., due for completion in November, will include 43 miles of 16-in. line and 24 miles of 4 to 10-in. line. Saratoga is a subsidiary of Westcoast Transmission which will buy Alberta gas of El Paso Natural Gas. The system is expected to handle up to 75,000 M.c.f. daily.

LPG is being handled by two-thirds of all products pipelines built in the U.S. last year. Product lines completed in 1960 totaled 3,632 miles, and the Association of Oil Pipe Lines reports that 2,419 miles of these lines were for LPG. Only 502 miles of crude-oil lines were built in 1960.

Reconditioning of 65 miles of 10-in. loops on the Plantation Pipe Line system between Winder, Ga., and Greensboro, N. C., has been started by Latex Construction.

Capacity will be boosted on Service Pipe Line's crude line from La Plata, Mo., to Wood River, Ill., by the addition of 60 miles of 12-in. loops. River Construction, Fort Worth, has started work on the project which will increase capacity from 20,000 bbl. to 77,000 bbl. daily.

Gathering system of Kentucky-West Virginia Gas in Knott County, Kentucky, is being extended by the addition of 9.5 miles of 8-in. line.

Higher-Strength Pipe Sought by AGA Group

• Research for a pipe which will meet future needs has uncovered some important facts about ruptures. Tests show certain defects can trigger self-propagating cleavage. Wall thickness does not solve the problem.

WITH pipelines growing in size and capacity, the need for high-tensile pipe of still higher strength is becoming increasingly apparent.

Pipe able to meet such demands has been the object of an 8-year search by the American Gas Association Pipeline Research Committee. Some progress has been made, but a lot of ground is still to be covered.

Initial results were reviewed recently at a seminar sponsored by AGA in Dallas. Purpose of the meeting was to show what has been done, give some idea of what is still ahead and enlist the support of more companies in the effort.

Research scientists from Battelle Memorial Institute, Columbus, Ohio, reported on spectacular field tests conducted at Athens, Ohio. In the tests pipe was broken to analyze shearing and self-propagating cleavage fracturing.

The tests showed that such breaks are triggered by certain types of defects. However, the defects rarely occur and they can be readily identified at the mill and in the field.

The Battelle researchers found that plain dents no deeper than 3% of diameter are harmless. And a change will be recommended in the ASA B31.1-8 code for gas pipelines.

Thickness of pipe is not the only criterion for safety. Increasing wall thickness does not solve the problem of getting more notch toughness.

However, scratches and gouges in dents were found to be a cause of triggering ruptures—just as they are elsewhere on the surface of the pipe.

Improved inspection methods now widely used at pipe mills will tend to reduce the incidence of such troubles. Ultrasonic tests are in common use in many mills. In addition, emphasis is being given to elimination of surface damage, slag inclusion and the lack of weld penetration.

It was pointed out that improvements in consistency of pipe quality has been increasingly apparent even though specifications have stayed the same. But since pipe is the most important single part of pipeline economics — accounting for more than two-thirds of all pipeline expenditures—the importance of exacting specifications is evident.

Efforts are being made by the researchers to correlate data on notch toughness with other industries, particularly tank and ship building. These industries use the Charpy impact test to determine the transition temperature from ductile to brittle fracture, vital information for determining the notch toughness of steels.

Part of the Battelle program is to determine relative value of the different methods of increasing notch toughness. Each has a price tag as well as its advantages and disadvantages.

One method is to lower carbon content and raise the magnesium content. And finer grained steels can be produced by improved roller practices and normalizing. A third possibility is that fully killed steels are better than semikilled, and semikilled, in turn, better than rimmed steels.

There is a need for correlation of field and laboratory data, the research scientists said. The Charpy laboratory test indicates that, at the 10-ft.-lb. level, the transition temperature for a certain steel is 30° F. The Athens field test showed the actual temperature to be 100° F.

A phenomenon discovered in the Athens tests is the difference between the speed of ruptures and the speed of the decomposition wave in the gas.

At 0° to 20° F., the speed of rupture was 2,000 ft. per second, and the speed of the decomposition wave, 1,300 ft. per second. After the pipe has been completely shattered, there is a short lag before the gas begins to disperse. The gas, in effect, "has not yet learned" that it is no longer held in by the pipe.

Raymond H. Crowe, chief engineer, Transcontinental Gas Pipe Line Corp., and Baxter D. Goodrich, senior vice president, Texas Eastern Transmission Corp., led the seminar discussions. More than 100 representatives of major gas pipelines attended.

Mid-America Line Expanding

• LPG system, completed last December, already plans two branch extensions to serve markets in Central Iowa.

EXPANSION projects already have been launched by Mid-America Pipeline Co. only 3 months after the liquefied petroleum gas pipeline was completed.

Robert E. Thomas, Mid-America president, said two branch extensions are planned to serve new market areas in Central Iowa. Cost of the two projects is estimated at $4.5 million.

Right-of-way acquisition began in January and already is 75% complete on the first extension from Whiting to Ogden, Iowa. Construction on the 106-mile, 6-in. extension will begin this summer with completion scheduled for next fall.

The second extension will be from Ogden to Charles City, Iowa, about 100 miles. Construction on it is scheduled for 1962.

Both extensions will branch from the west leg of the main Mid-America line. Pumping capacity of the west leg also is being stepped up with one additional pump station at Whiting.

Thomas said the extensions will enable Mid-America to serve additional markets in the vicinity of Des Moines, Mason City, Waterloo, Cedar Rapids, and Davenport. The 2,200-mile LPG pipeline system was completed last December.

JET STREAM on target

One of the most versatile tools in the oil country, Halliburton Hydra-Jet has multiple applications in fracture initiation, casing cutting, perforating and workover. Designed with two, three or four jets, the Hydra-Jet tools are flexible in their downhole use, and have been designed to run through pipe sizes of 2" I.D. and larger.

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PERFORATING... through casing with a Hydra-Jet tool held stationary creates a clean "potato-shaped" cavity extending several inches into the formation.

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New Try Made for Accord on Iraqi Oil

● In their latest efforts to deal with a hard-headed prime minister on the future of Iraq's oil, foreign-controlled companies are cast in the role of political agitators. But they can be stubborn in this war of nerves, too.

WHEN STREET RIOTS led by taxi drivers broke out in volatile Baghdad last week, the Prime Minister of Iraq hinted the unrest was the fault of the country's French-British-American controlled oil industry.

Actually, the riots were a protest against a government-imposed 5-cent increase in the price of gasoline.

Abdul Karim Kassim, the country's military strong man, said publicly that the riots were designed to weaken the government's position in talks with oil men.

Kassim, who led the bloody Iraqi revolution of July 1958, used the occasion as an excuse to tell his people he is working hard "to fully wrest the rights of the Iraqi people" from Iraq Petroleum Co.

That was the atmosphere that faced a team of IPC negotiators who went to Baghdad to try once more to come to terms with Kassim on the future of Iraq's oil.

The war of nerves has been going on for 2 years, with the Iraqis demanding more and complaining more throughout that period.

At stake are three oil concessions, each with more than 40 years to run and more than 1 million barrels in daily oil production.

The talks now in progress are the latest in a series which so far has failed to settle anything conclusively.

There are six primary issues on which some sort of agreement must be reached. They are:

. . . **Surrender** of concession areas. Obviously this is a central issue with the Iraqis. The three oil companies involved in concessions have long agreed to the principle of handing back some of the areas in which they operate.

But there's a dispute over how it should be done. The Iraqis want to select the areas to be surrendered. The companies think they should have the choice.

. . . **More income** from Iraq oil for the government. Like other producing areas in the Middle East, the Iraqis are no longer satisfied with half the money from their oil. They want more, but the companies are resisting.

. . . **Faster Iraqization** of the companies. Similar demands are being made throughout the Middle East and this is no more of a central problem in Iraq than anywhere else. It is mainly a rallying cry. At present, 96% of those employed by the three companies in Iraq are natives of the country.

. . . **Appointment** of an Iraqi executive director on the boards of the companies. Such an appointment would give Iraq a direct hand in the operation of the companies.

. . . **Establishment** of a joint committee of Iraqis and IPC personnel to supervise company expenditures.

. . . **Preferred treatment** for Iraqi-owned tankers in moving Iraqi oil to its markets. The Iraqis want to form a tanker company and to be assured that it will have the business.

Despite the fact that the country has recently created an oil ministry and has completely revamped its governmental agencies dealing with oil, Kassim has assumed personal control of the talks with IPC.

It is obvious that he wants to take credit for "wresting" control of the industry from the private companies.

Concession surrender . . . In the 1920's and 1930's, IPC and its affiliated companies—Basrah Petroleum and Mosul Petroleum—were granted separate concessions which cover virtually all of Iraq's 172,000 sq. miles.

There was no provision for the companies to turn back any land before the end of the 75-year concession. Now the Iraqis want a big part of it.

Their plans for any returned territory aren't clear. Oil concessions in neighboring Iran are going begging. The Iraqis themselves are operating only one oil field—Khaniqan, the lone oil property in their country besides the IPC group concessions. It produces about 3,000 bbl. daily.

Still the nationalists in Iraq insist that the IPC group has too much area and is not developing any of it fast enough for the good of the nation. Obviously they feel that the country can offer returned areas to other companies on more favorable terms.

IPC and its associated companies have offered to surrender 90,000 sq. miles of the concession area provided the companies can do the picking.

An impasse developed when the Iraqi negotiators insisted that 100,000 sq. miles be given up and said they wanted to select the areas. However, there is every chance of a compromise.

Increase in income . . . Under the terms of the original 50-50 profit division agreement, Iraq is entitled to added income under a "most-favored-nation" clause if other producing countries in the Middle East receive better terms.

Now that better "paper" terms have been granted to Iran by the Italians and by an American com-

pany and to Kuwait and Saudi Arabia by the Japanese, the Iraqis want to make this an issue.

The IPC position is that its agreement calls for matching any higher profit per ton received by any other Middle East producing country. The company argues that so far no other Middle East producer has received a better income per ton than Iraq, in spite of agreements that appear to grant better terms on paper.

G. H. Herridge, managing director of IPC, told Kassim at a meeting several months ago that his companies would be ready to match a higher per-ton figure for Iraq if the government could prove that any other country was receiving a better unit income than Iraq.

Iraq participation . . . The basic questions of an Iraqi executive director and a joint committee to oversee expenditures are technical demands of the government. These demands are in line with generally nationalistic ambitions.

Overshadowing these are the demands of the government that Iraq be given actual stock participation in the IPC group. Since the governments of Iran, Kuwait, and Saudi Arabia have been offered a shareholder's interest in new exploration ventures, Kassim has been particularly insistent on this point.

The concession agreement provides for Iraq to have preference in taking up a 20% interest in any new stock issue made by the companies. Kassim insists that this provision should open the door for Iraqi participation in the entire IPC group operations.

Actually there has never been any new stock available, nor is there likely to be under present circumstances.

The knowledge that the owners of IPC have no intention of a public stock offering irritates Kassim. This could open the way for some drastic action on his part.

The French have long feared nationalization of their interest in the IPC group because of Arab enmity over the Algerian issue.

Proposals for Iraq to take over the 23.75% interest held by Cie. Francaise des Petroles appeal to the Arab nationalists in Baghdad who are critical of the French for not granting Algerian independence.

Proposals have been made openly in Baghdad for outright seizure of the 5% interest held by the estate of C. S. Gulbenkian, the Armenian manipulator who gained the interest in return for negotiating the agreements which preceded the current concessions.

The remaining interest in the IPC group is divided three ways. British Petroleum Co. holds 23.75%; the Royal Dutch-Shell group holds 23.65%; and the other 23.75% is held by Near East Development Corp., owned jointly by Jersey Standard and Socony Mobil.

Settlement of differences over Iraq's oil won't be easy. Too many of the basic Iraq demands strike at the business philosophy of the western oil companies.

Political implications for Kassim are involved, too. The prime minister could solidify his still-shaky position as head of Iraq if he could boast of a real coup with IPC.

These factors make it probable that a settlement, if and when it comes, will not necessarily be based on either good business or good governmental practices.

Wildcat Under Guard in Spanish Sahara

A WILDCAT drilling in the northern part of the Spanish Sahara is under heavy guard because of a recent border dispute in which 11 members of a geophysical crew were seized by Moroccan irregulars and held for several days.

The Daora No. 1-1 was drilling ahead below 4,900 ft. last week.

Union Oil Co., operator on the well, says it is being closely guarded.

The United Geophysical crew was working for Union. Members were released unharmed.

The U. S. State Department has been conferring with Moroccan authorities in an effort to recover three trucks and other equipment seized with the men.

Union and its Spanish partner, Cia. Iberica de Petroleos, are scheduled to take the Daora well to 13,200 ft. or basement, whichever comes first.

Excess Naphtha Returned to Arab Field

ARAMCO IS SOLVING its excess-gasoline problem at Ras Tanura refinery by reinjecting surplus naphtha into an oil field.

The company last year recycled 1,897,610 bbl., or about 5,200 bbl. daily of naphtha, the raw cut from which motor gasoline is blended. The naphtha was returned to a producing formation of Qatif oil field.

Reinjection of the refined product is being carried out for economic reasons, rather than for pressure maintenance.

Aramco's biggest market is for fuel and diesel oil. In order to have the processing flexibility needed to meet the demand, the company is producing more naphtha than it can market readily.

It is cheaper to return the naphtha to formation than to build storage tanks. Eventually the naphtha will be recovered as part of the crude it enriches.

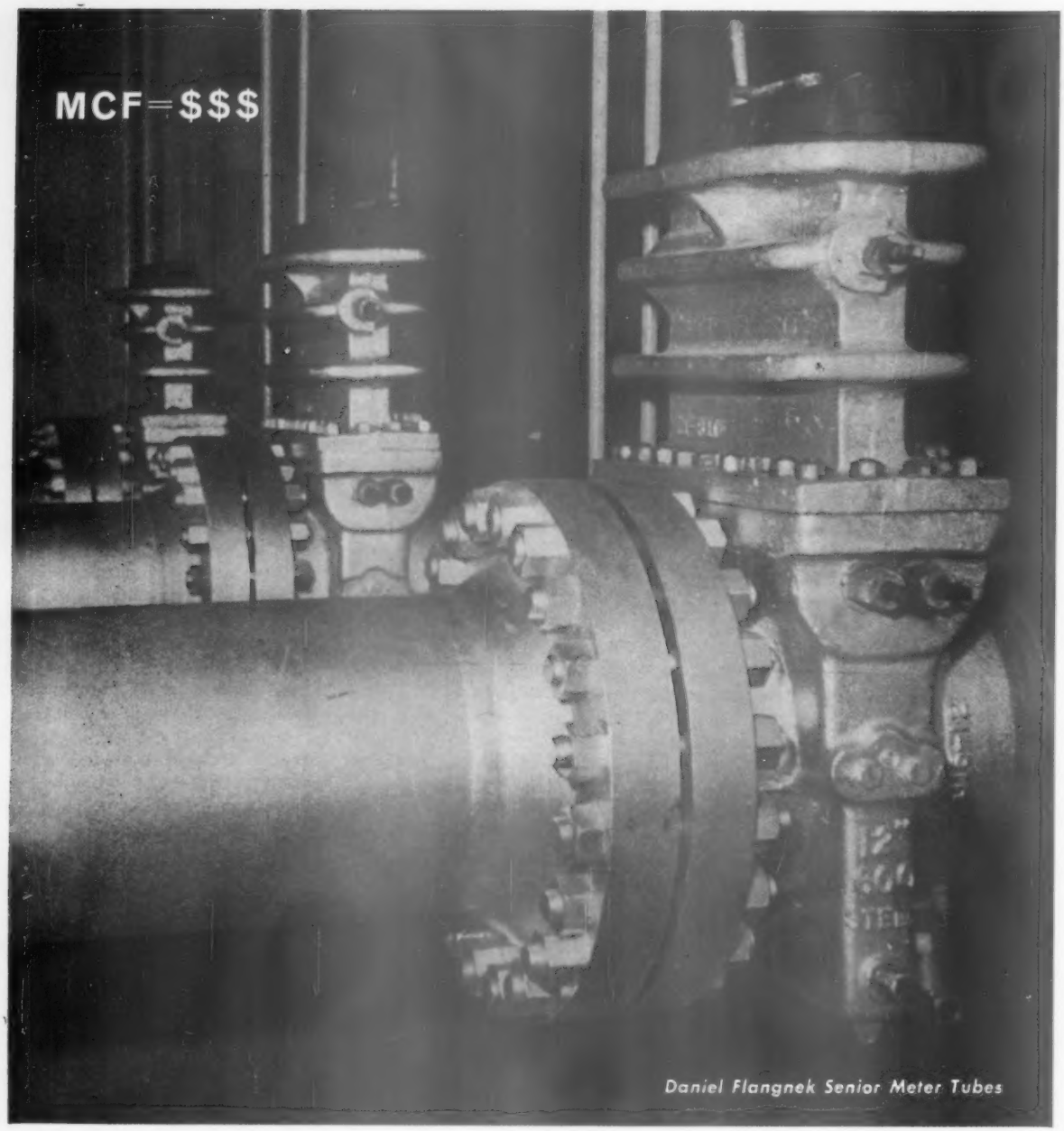
Qatif was selected to receive the naphtha because it is the field closest to the refinery. It is Saudi Arabia's smallest field on commercial production, averaging about 14,700 bbl. daily.

Refinery runs up . . . Ras Tanura products are channeled mostly into east - of - Suez markets, where demand is heavy for fuel oil and light for gasoline.

Last year, runs rose 29.4% to 224,900 bbl. daily. This is considerably more than the nominal capacity of the refinery, which is rated at 189,000 bbl. daily.

Fuel-oil output averaged 124,700 bbl. daily, or 55.3% of yield. Diesel oil was second, averaging 29,100 bbl. daily, or 12.9% of yield. Motor gasoline was third, averaging 26,700 bbl. daily, or 11.9% of yield.

Other products accounted for 44,400 bbl. daily, or 19.9% of yield.



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Japan Puts Marketing Strings on Khafji Oil

• Established oil companies in Japan get some government support in their fight against preferential treatment for new Persian Gulf crude. But the restrictions on the supplier, Arabian Oil, may not be a permanent setback.

OIL COMPANIES have won the first skirmish over the role of new Japanese-controlled crude supplies in the booming Japanese market.

The victory was not final nor entirely one-sided. But as the first cargo of Arabian Oil Co. crude neared Japan last week, the government favored established companies on three vital points that have been fiercely argued for months.

The Tokyo-based Arabian Oil Co. is hauling crude from Khafji field in the Persian Gulf, off the Neutral Zone. The company now has 10 wells rated at 6,000 bbl. daily each, and is planning on a productive capacity of 200,000 bbl. daily in 2 years.

Arabian Oil raised a hornet's nest of opposition by seeking preferential treatment for its oil on price and markets in Japan. It has lost out, for the time being at least, in government rulings that specify:

. . . **Khafji crude** must be purchased within the framework of the existing foreign-exchange-allocation system.

. . . **Purchase price** must be the going "commercial" rate, rather than posted price plus freight.

. . . **Arabian Oil** may not establish a marketing organization in Japan.

One company has complained that there is more to the story. It claims the government is exerting unofficial pressure on importers to purchase their prorated share of Khafji crude, or face a proportionately lower foreign exchange allocation in the future.

Thus the oil, in practice, may be getting preferential treatment.

As the ruling stands, however, individual companies are free to bargain with Arabian Oil over price. Through last week, many importers still had not made deals for Khafji crude.

Established importers fighting to retain the right to select their own supplies and bargain over prices have had two points in their favor.

One is that the purchase of Khafji crude at posted price would tend to raise the price of products in Japan.

Another is that Japan's healthy trade balance enables the country to allot U. S. dollars for crude purchases without undue strain on the economy.

This takes some of the steam out of Arabian Oil's argument that only royalties due the Kuwait and Saudi Arabian governments would have to be paid in dollars. Its own profits and costs could largely be covered by yen.

Demand to soar . . . Underlying the struggle is the fact that Japan is one of the world's fastest-growing oil markets.

The Petroleum Association of Japan expects demand to reach 1,790,000 bbl. daily in 10 years—an increase of more than three times over last year.

The association estimates the local refining industry will require an investment of $2.64 billion over the next decade to keep up with surging consumption. About $1.7 billion of this will be spent on process facilities that will include:

. . . **Topping capacity** of 2,570,000 bbl. daily, expanded from the present 730,000 bbl. daily.

. . . **Reforming capacity** of 427,000 bbl. daily, a ninefold increase.

. . . **Cat cracking capacity** of 233,000 bbl. daily, a gain of 4.7 times over existing facilities.

In addition, $840 million will be required for tankage, transportation, and various facilities. Another $100 million will be needed for home office and other expenses.

The amount of land needed for refinery sites—a vital question in Japan—will increase from 3,140 acres now in use to 9,530 acres by 1970. Companies already have in hand 3,260 acres on which planned refineries will be built.

1960 boom . . . Inland demand of 460,000 bbl. daily last year was up 38.3%. This figure does not include refinery fuel or losses, nor bunkers used in international trade. Exports accounted for another 46,000 bbl. daily.

The inland increase was due to a 50% rise in fuel-oil sales, which rose to 282,000 bbl. daily. This includes a phenomenal rise of 89.9% in heavy-fuel-oil sales to 163,000 bbl. daily.

Gasoline consumption was up 21.9% to 95,000 bbl. daily. Kerosine sales were up 26.6% to 30,000 bbl. daily. Gas-oil rose 29.6% to 33,000 bbl. daily.

The Middle East continued to supply the lion's share of crude to Japanese imports of 526,000 bbl. daily.

The total share of market supplied by Persian Gulf crude declined from 83.3% to 80%, however, as the result of increasing shipments from Russia. These rose to 21,000 bbl. daily, accounting for 4% of Japanese imports.

Another 82,000 bbl. daily originated in the Far East. Shipments of Western Hemisphere crude declined to about 2,000 bbl.

Big Platform Built for ENI

AN ITALIAN-BUILT mobile drilling platform will head for the Persian Gulf this spring for work on an Iranian offshore concession held by Italy's state oil agency, ENI.

The platform was built by an ENI affiliate, Nuovo Pignone, at Massa Carrara under an agreement with R. G. LeTourneau, Inc.

LeTourneau provided the design and some of the parts. Nuovo Pignone will furnish one of its Ideco-Pignone E2500 rigs rated at 6,000 meters, or nearly 20,000 ft.

The triangular-shaped platform, called the "Gatto Selvatico," is 186-ft. long on its longest side and has 178-ft. legs. Total weight is 2,000 tons.

SIRIP, owned 50-50 by National Iranian Oil Co. and an ENI affiliate, AGIP Mineraria, has a 3,500-bbl.-daily discovery on its offshore concession at the head of the Persian Gulf.

TWO CARS are filled simultaneously with the same grade of gasoline, left, at a Shell station in England which is trying out a new dispensing system. One of the most novel features of the system is the "tele-reader" unit, above, which can indicate regular or premium sales on either face.

New System Streamlines Gasoline Dispensing

A NEW fueling system designed to improve service-station gasoline dispensing is being tried out in England by Shell International Petroleum Co., Ltd.

The system separates the pump, price-volume indicators, and dispensing hoses. This split-up is aimed at giving customers a better view of price dials, speeding gas deliveries, and permitting more flexibility in station layout.

The prototype unit was built by Wayne Tank & Pump Co., Ltd., British subsidiary of Wayne Pump Co. The system is not in actual production.

A "tele-reader" component is the most obvious variation from a standard pumping unit.

This has two faces—each showing in large numbers and letters the grade, price per gallon, volume, and price of sale. The remotely controlled unit is actuated electrically, rather than mechanically—making it possible to place the unit a considerable distance from dispensers.

The control panel and hose reel differ from conventional units. Each panel houses two hoses and two sets of controls.

The experimental station being used by Shell has two dispensing units with a total of four hoses and four sets of controls.

Two hoses dispense regular, and two premium. But it is possible to fill two cars with the same grade simultaneously.

The pumping unit, which is installed separately, houses the gasoline pump itself, the meter, and the variator section of a standard computer. This sends electrical impulses which control the tele-reader.

First demonstration of the system in the U. S. will be made May 3-5 at an engineering conference scheduled by Wayne Pump in Salisbury, Md.

FOREIGN BRIEFS . . .

A new fertilizer project will be opened next year at Barra a Barra, near Lisbon, Portugal, by Uniso Fabril do Azoto. Units will include a 180-ton-daily ammonia plant, a 40,500-ton-yearly urea plant, and plants for producing nitric acid, and ammonium nitrate. M. W. Kellogg Co. and two subsidiaries have been awarded contracts for all major process facilities.

Bids for design and construction of a 20,000-bbl. refinery in Tunisia are being sought by Soc. Tuniso-Italienne de Raffinage (STIR), a joint Tunisian Government-ENI company. The plant, which probably will be located either at Bizerte or La Goulette, will be expanded to 30,000 bbl. later.

A new method of cleaning and redrilling sand plugs in producing wells with a turbodrill has been used successfully in the Chateaurenard field of the Paris basin by Cia. d'Exploration Petroliere. FLOPETROL, a French servicing company, was operator.

Construction bids for expansion of the Syriam, Burma refinery from 5,300 bbl. to more than 18,600 bbl. daily are being sought by Burma Oil Co. (1954), Ltd. Target for completion of the program is early 1963.

A $280 - million petrochemical complex is planned near Rotterdam during the next 10 years by Imperial Chemical Industries. Aim of the big British company is a foothold in Europe's Common Market area. Construction will start next year.

Contract for engineering of a plant employing a Belgian ammonium-nitrate production process has been awarded by a Dutch firm. MEKOG let the contract to the Societe Belge de L'Azote et des Produits Chimiques du Marly (SBA), which developed the technique. The plant will be built at Pernis, the Netherlands, and will have a capacity of 285 tons daily.

THIS NEW MEDIUM RANGE CENTER LINE MOUNT PUMP WILL HANDLE VIRTUALLY ANY LIQUID USED IN A PROCESS PLANT

PEERLESS PUMPS

Interchangeability feature of Peerless DMR pumps allows tailor made construction from standard parts to fit your plant's exact needs . . .

What's your pumping problem? Are you moving hydrocarbons, process chemicals or perhaps it's corrosive feedstocks that must be transferred. Then the Peerless DMR is the pump for you. Consider these reasons. The DMR will be assembled to handle your exact pumping needs. No need of compromising or re-vamping your intended plans. The DMR is a proven-in-use pump. You get a reliability factor you can be sure of. The integrated features of the DMR reduce need for large stocks of inventory parts—in some cases by as much as 85%. The DMR is an easy pump to apply. Installation is readily accomplished with little downtime. Long operating periods with minimum maintenance attention adds to the savings these pumps offer. And quick accessibility to interior parts simplifies servicing when and if required. What's more, the DMR has an attractive price tag that you will like. So get the full facts now. Write Peerless for a copy of Bulletin B-1610 which describes the new DMR pump in complete detail.

TYPE DMR CHARACTERISTICS

TYPE: Single stage, horizontal, end-suction, top discharge. **DISCHARGE SIZES:** 1", 2", 3" on 8½" frame: 1", 2", 3", 4" on 10½" frame. **CAPACITIES:** Up to 900 gpm. **HEADS:** Up to 450 feet. **WORKING PRESSURE:** Up to 300 psig. **LIQUID TEMPERATURE:** Up to 450°F. **CONSTRUCTION MATERIALS:** Any machinable metal. Cast iron, carbon steel, and stainless steel liquid ends are carried in stock as standard. **DRIVES:** Electric motor or steam turbine. **LUBRICATION:** Oil lubricated bearing frame. **LIQUIDS HANDLED:** Virtually all liquids used in refinery and petrochemical processing.

Putting Ideas to Work

PEERLESS PUMP
HYDRODYNAMICS DIVISION
Plants: Los Angeles 31 California, and Indianapolis 8, Indiana.

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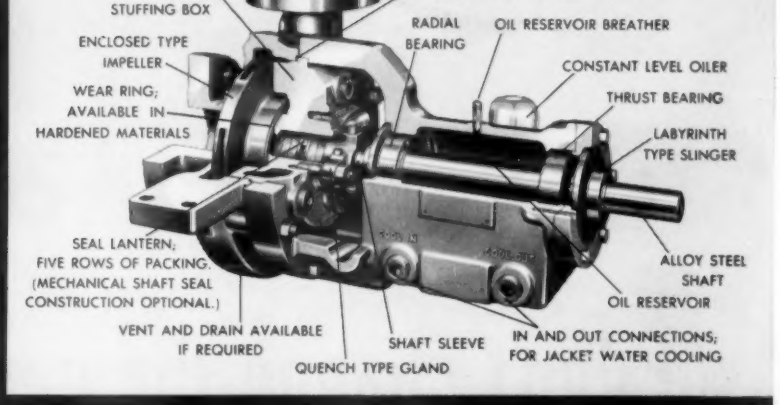
HEAVY DUTY VOLUTE; ASA RATED CAST IRON AND STEEL FLANGES
BACK PLATE; WATER COOLED TYPE WITH EXTRA DEEP STUFFING BOX
CONFINED TYPE GASKET
RADIAL BEARING
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ENCLOSED TYPE IMPELLER
CONSTANT LEVEL OILER
WEAR RING; AVAILABLE IN HARDENED MATERIALS
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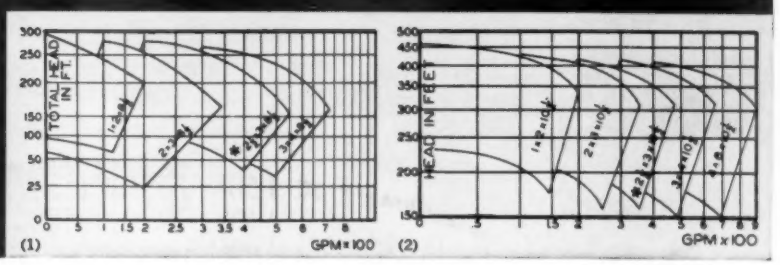
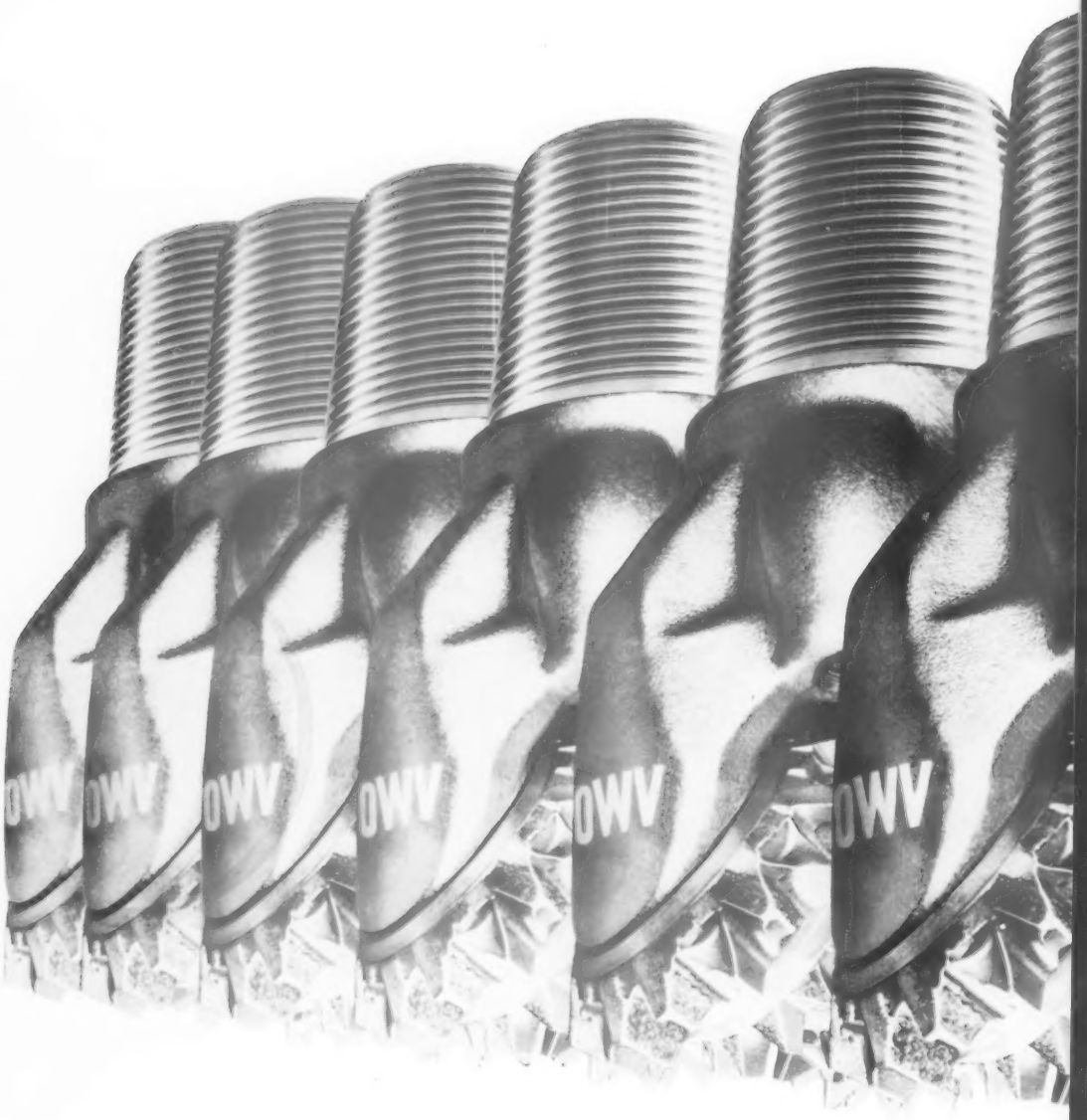
VENT AND DRAIN AVAILABLE IF REQUIRED
SHAFT SLEEVE
IN AND OUT CONNECTIONS; FOR JACKET WATER COOLING
QUENCH TYPE GLAND

PERFORMANCE CURVES
PEERLESS TYPE DMR PUMPS
8½" and 10½" at 3500 rpm

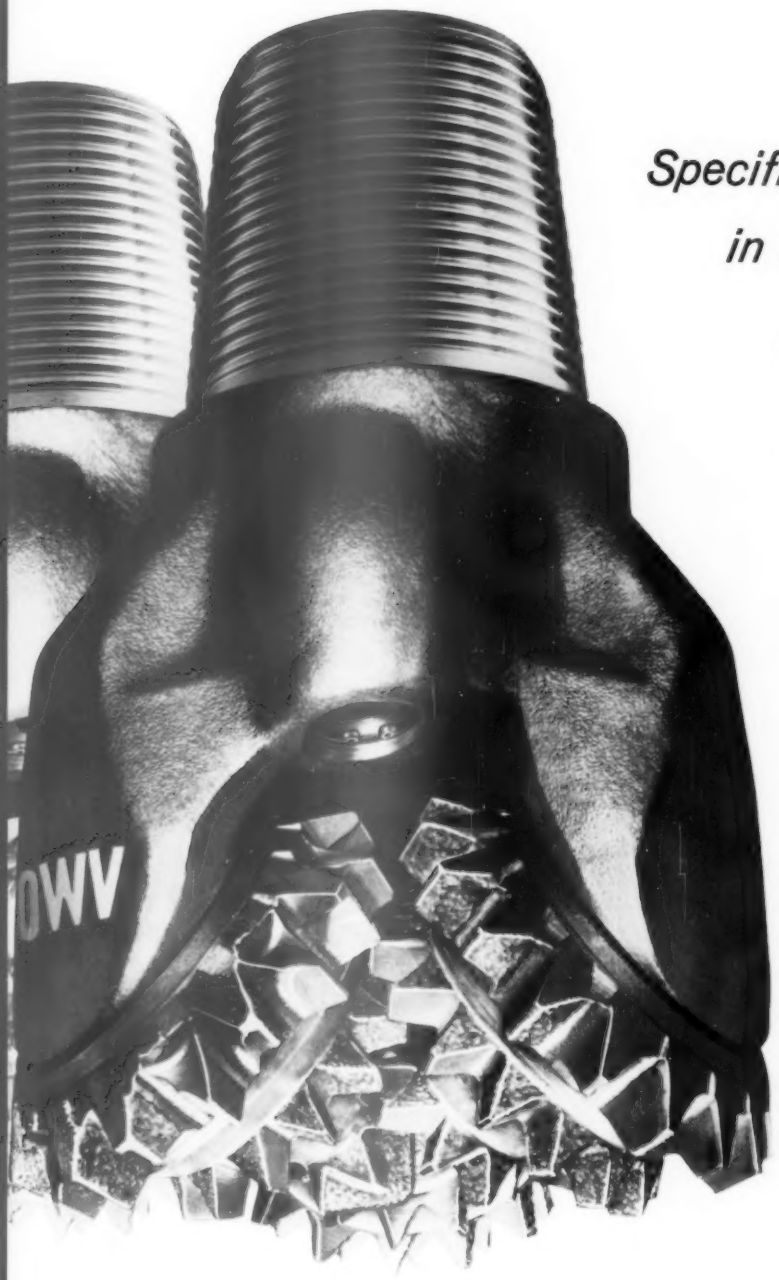
Peerless DMR Pumps are available with both 1750 and 3500 rpm drives. Shown at right are typical curves for (1) 8½"—3500 rpm, (2) 10½"—3500 rpm.





We don't change the name...we change

Regardless of how well a bit performs, our engineers are never satisfied. They are continually challenged by new facts from research and the field to find new ways to increase footage and penetration rate. The



Specific new improvements in the **Hughes OWV**

7 major changes in the OWV are helping to increase footage and penetration rate and lower hole costs

Change No. 1 lengthens life of bit under severe operating conditions. Bearing pin substantially strengthened.

Change No. 2 assures better bearing alignment during life of bit. Thrust bearing capacity increased.

Change No. 3 lengthens bearing life and cutting life of bit. Metallurgy of roller bearings greatly improved.

Change No. 4 protects roller race from "shirt tail" wear. This is achieved through a new hard pad design.

Change No. 5 assures a better balanced cutting structure. This results from improvement in cone design that strengthens teeth, spearpoint and gage.

Change No. 6 assures longer tooth life. Improved hardfacing provides greater resistance to wear.

Change No. 7 achieves an improved balance between bearing capacity and cutting structure that extends life of bit and permits use of heavier weights. The result: more hole per bit at lower cost!

the performance

seven recent improvements made in the already highly versatile, fast-drilling OWV have made it an even better performing bit. For the most economical hole you can drill . . . go all the way with Hughes.

HUGHES

ORIGINATOR AND WORLD'S LEADING DEVELOPER OF CONE-TYPE ROCK BITS

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what makes an acid treatment profitable?

In Oklahoma, a Dowell-engineered acid treatment gave the desired production increase, yet cost $1350 less than treatments used on other wells in the same field.

In Utah, Dowell-engineered acidizing boosted well production from 34 to 450 bopd in a field where other acid treatments had broken through to water.

In South Texas, a Dowell-engineered acid treatment opened up a salt water disposal well where earlier treatments had failed.

What single difference made these treatments more successful than earlier efforts?

The one difference that towered above all others is engineering. Dowell designed each treatment to fit well conditions and the operator's needs. The result was extra profit.

Dowell is well-qualified in the kind of engineered treatment design that results in excellent profit increases.

Dowell developed the Acid Guide* — a new method for designing treatments and predicting probable results. Several thousand successful acid jobs have been designed with the help of the Acid Guide within the past two years.

Dowell has an unsurpassed fund of data on formation and fluid characteristics from many fields. This information is necessary for scientific treatment planning but it is often not available from individual operators.

Dowell has a large variety of acid additives as well as collateral products and services to improve results from acid treatments.

To summarize, Dowell has the experience, the information, the acid additives, the collateral products and services, the technically-trained personnel and the laboratory facilities to design engineered acid treatments. Results have been high success ratios and satisfactory payouts on investments.

There *is* a difference in acidizing services. Dowell services and products are offered from more than 150 offices and stations in the United States, Canada, Venezuela, Argentina, Germany, France and the Sahara area. Dowell, Tulsa 1, Oklahoma.

*DOWELL SERVICE MARK

SERVICES FOR THE OIL INDUSTRY

DOWELL

DIVISION OF THE DOW CHEMICAL COMPANY

4 ways to convert gas into electricity

1. THE FUEL CELL consists of two porous electrodes separated by an electrolyte. Gas is fed into one electrode and air or oxygen into the other with the resulting oxidation creating electricity.

2. THE THERMOELECTRIC GENERATOR works on the principle of applying heat to the junction of two unlike metals. Heat raises the kinetic energy of the electrons at the hot junction above the energy at the cold junction. This causes a flow from the hot to the cold junction.

3. THE THERMIONIC CONVERTER consists of two electrodes in a vacuum or in cesium gas. The cathode is heated causing electrons to flow through the space to the anode and back to the cathode through an external electric circuit.

4. THE MAGNETOHYDRODYNAMIC (MHD) CONVERTER produces electricity when high-temperature gas is moved through a strong magnetic field. Gas is heated to 3,000°-5,000° F. to achieve conductivity. The heat source can be natural gas, oil, or coal.

THERMOELECTRICITY—

. . . a new demand for natural gas

By CARL LAWRENCE
West Coast Editor

THE NATION'S missile program and the search to find small generators which produce electricity has created a stepped-up research program in thermoelectricity, the direct conversion of heat into electric current.

The researchers who are trying to find these power sources for missilemen are turning up some new steps in converting natural gas into electricity.

There are four methods of converting gas into electricity: Fuel cells, thermoelectric generators, thermionic converters, and magnetohydrodynamic (MDH) converters.

A recent gas-technology seminar sponsored by the Southern California and Southern Counties Gas Companies in Los Angeles turned up some glowing reports on progress made in the field of thermoelectricity.

Frank M. Foster, vice president of Southern California Gas, said the progress made in converting gas to electricity may result in the home of the future relying on just one power supply—natural gas.

The work done to date indicates some forms of the four conversion devices may be used for domestic, commercial, and the military market. Some thermoelectrical converters already are in use on a small scale, but the reports from the Los Angeles meeting stress more research is needed before any can be adapted to wide usage.

The prediction is that some of the devices will be ready for the market within the next 10 years.

The thermoelectrical devices, if they are developed along the lines now being pursued, will have the advantage over conventional generating plants of being smaller and more efficient. They also have the advantage of having no moving parts.

Here's the progress report on the four devices given at Los Angeles:

1. Fuel Cell

Several natural-gas fuel cells are operating in the laboratories of the Institute of Gas Technology of Illinois Institute of Technology, Chicago.

Dr. Martin Elliott, director of the gas institute, says the interest in fuel cells can be traced to the high efficiency which theoretically is possible by the direct conversion of gas and other fuels into electricity.

"Many fuels would have theoretical conversion efficiencies ranging from 85 to 95%," Dr. Elliott says. "In practice, somewhat lower values will be obtained."

Dr. Elliott expects fuel cells to be used in appliances in which substantial quantities of electrical power are generated. He predicts fuel cells will be used in smaller power applications within the next 10 years, then spread to larger power units.

Many companies are researching fuel cells and Allis-Chalmers has powered an electric tractor with a fuel cell working off bottled gas.

2. Thermoelectric Generators

The principle of TE generators has been known since 1822, but development was sidetracked for many years as researchers focused their interest on the induction generators which grew out of Michael Faraday's discovery in 1831 that electrical current could be produced by moving a wire through a magnetic field.

John Gayle, of Stanford Research Institute, said 25 TE generators have been reported in the last 2 years. This sudden growth shows the renewed interest in this converison method.

A natural-gas pipeline, Northern Illinois Gas Co., recently made what is believed to be the first industrial purchase of a TE generator. Northern Illinois bought a 100-watt Westinghouse Electric Co. unit to use in its cathodic-protection program.

Gayle says two problems are delaying further development of TE generators: The high cost of thermoelectrical materials and the

A FUEL CELL running off natural gas is displayed by Dr. Martin Elliott, director of the Institute of Gas Technology at Illinois' Institute of Technology.

heavy weight per kilowatt of output. He estimates the cost of producing a TE power generator in volume would be over $1,000 per kilowatt compared to $50 to $150 per kilowatt for conventional generators.

"The big problem in materials development is that a material with a high electrical conductivity also is inclined to have a high thermal conductivity. As a result, unwanted heat flows through the TE material along with the electricity—heat that would otherwise be converted to electricity.

"What is needed is materials which go against the rule and are good conductors of electricity and poor conductors of heat as well as having a high thermoelectric power."

One device growing out of the stepped-up research program is the TAP 100 (terrestrial auxiliary power, 100 watts), which was built for the Air Force by Westinghouse. The unit is about the size of a medicine ball, weighs 40 lb., and produces enough electricity to light an average-sized room.

TAP burns propane gas, but could be modified to use gas or other liquid fuels. It also would operate from the energy obtained from the decay of radioactive isotopes. The Air Force expects to use the unit is remote locations where other power sources are not available.

The biggest TE generator in operation is a 5,000-watt demonstration model built by Westinghouse and Carrier Corp. for the Bureau of Ships. The unit used either natural gas or kerosine as a source of heat and has a efficiency of 12%.

Gayle says although there are many limitations in present TE devices that "many scientists think that the future of TE is bright."

3. Thermionic Converters

The space age has already created a market for thermionic converters, but they apparently are several steps removed from commercial development and from hydrocarbon fuels as a source of heat.

Radio Corp. of America has developed a thermionic device which fits into a tube about 12 in. long and 1¾ in. in diameter. The tube fits into the expansion cone or around the flame tube of a large solid-propellant missile such as Minuteman. Heat from the exhaust generates enough electricity to power the missile's steering instruments.

General Electric also has a space-age thermionic converter on the market. The converter is about the size of a silver dollar and weighs 3 oz. The unit delivers only 1 watt of power, but is designed for use in satellites where low power derived from the heat of the sun may kick off devices which send messages back to earth.

Finding more suitable materials is the main barrier standing in the way of further development of these devices.

4. MHD Converters

The development of MHD power has not progressed as far as the other three methods, but this method may be the one which will give natural gas its biggest new market in the future.

Gas can serve a dual role when used in a MHD generator. First the gas passes through the MHD plant to produce electricity, then it can be fed into a lower-temperature steam plant to produce more electricity.

"The combination MHD and steam might result in a 50 to 70% efficiency, compared with about 40% for the best steam plants today," Gayle says.

Gayle points out MHD is efficient only in large megawatt sizes. And this increased efficiency is due to the high operating temperatures rather than in the way the heat is converted into electricity.

The MHD generator also offers an advantage to the user who needs only direct current, which is the only current produced by the generators. If alternating current is needed, an additional 20 to 30% is added to the unit's cost for an a.c. inverter.

Much of the research being done in the MHD field is carried out by 10 eastern utilities. The group spent $350,000 last year in developing an experimental MHD generator and is scheduled to continue its program.

"MHD's big dilemma is the question of finding materials which will confine the hot plasma (gas) without disintegrating," Gayle says. "Many laboratories are working on materials with higher purity than those used in the hope of finding the kind of resistance to heat needed. Additional research is aimed at making the gas more conductive and in improving such pieces of MHD equipment as heat exchangers and inverters."

Heat factors play big role in furnace design

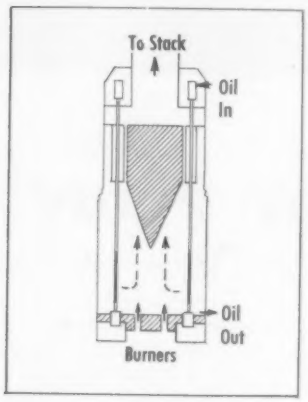
This material taken from process-training-program manual, Bayway, N. J., refinery of Humble Oil & Refining Co.

THE FIRST CONSIDERATION in the design of a furnace is heat transmission. There must be sufficient heating surface to allow heat to be transferred to liquid oil or oil vapors.

Second, the distribution between the number of radiant tubes and convection-section tubes must be such that the heat is transmitted efficiently.

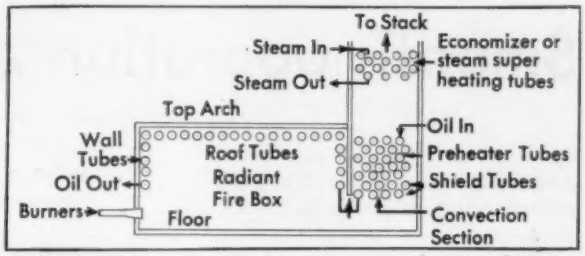
A third important consideration is pressure drop through the tubes. High pressure drops means high pumping costs. For these reasons, the number, size, and location of the furnace tubes are quite important.

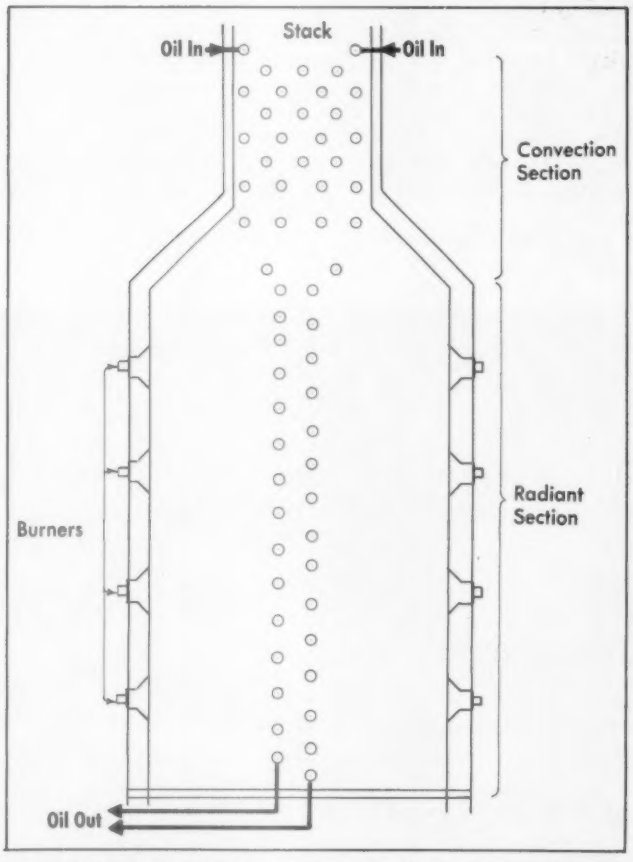
Figs. 5, 6, 7, and 8 show some of the types of furnaces in use at many refineries today.



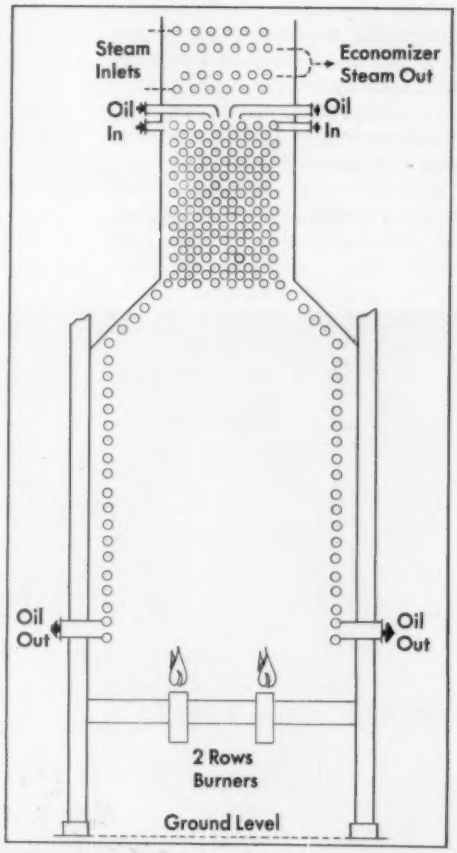
ISOFLOW FURNACE. Suited for any capacity and inexpensive to build. Fig. 5.

BOX TYPE OF FURNACE. This type of still is best suited for oil firing. Fig. 6.

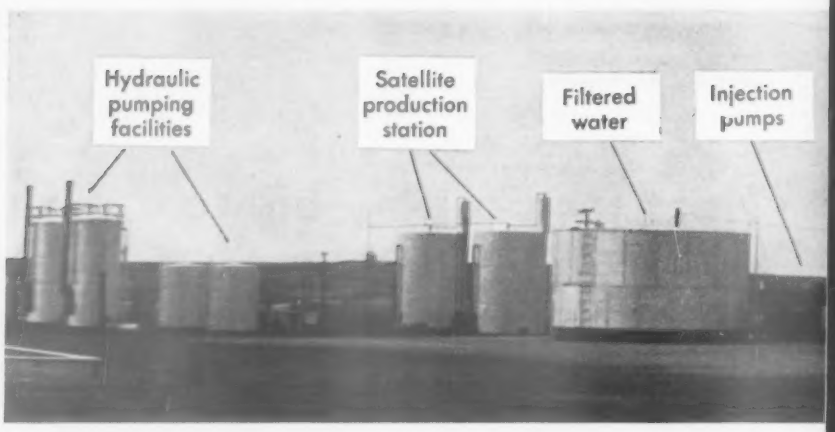




RADIANT-WALL FURNACE. Best suited for precise control of heat input and for operation at high (1,500° F.) temperatures. Fig. 7.



CABIN TYPE OF FURNACE. Best suited for large capacity. Fig. 8.



CONVENIENT GROUPING of equipment leads to efficient operation of Northeast Purdy units in Garvin County, Oklahoma. Shown here is equipment needed to handle pumping, separation, treating, and automatic custody transfer of oil, and one of the field's plants for water treatment and injection. This is just one of several central operating points that Cities Service, as operator, has designed for . . .

Smooth operation at Northeast Purdy

AUTOMATION is the big thing around Northeast Purdy field these days.

Three producing units and two productive sands are involved in the changes that are being made. Transfer to pipeline is made at four automatic custody transfer (ACT) points. Oil is supplied to these points by 40 test stations at 27 different locations throughout the field.

And 13 of these test stations are handling production from more than one unit.

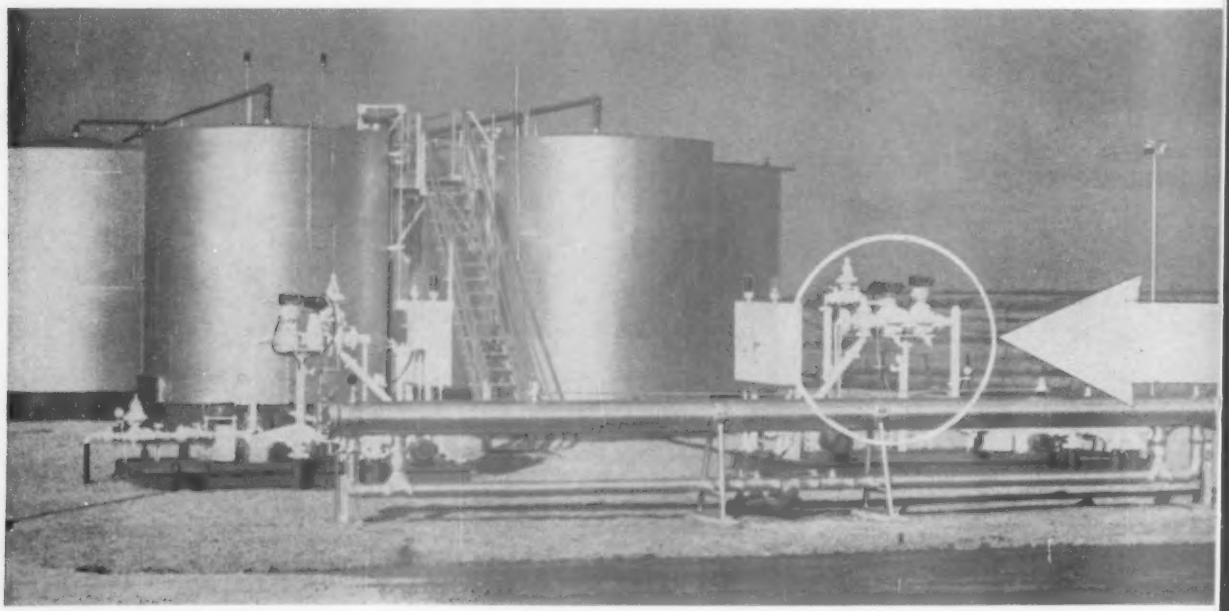
BY W. B. BLEAKLEY
Production Editor

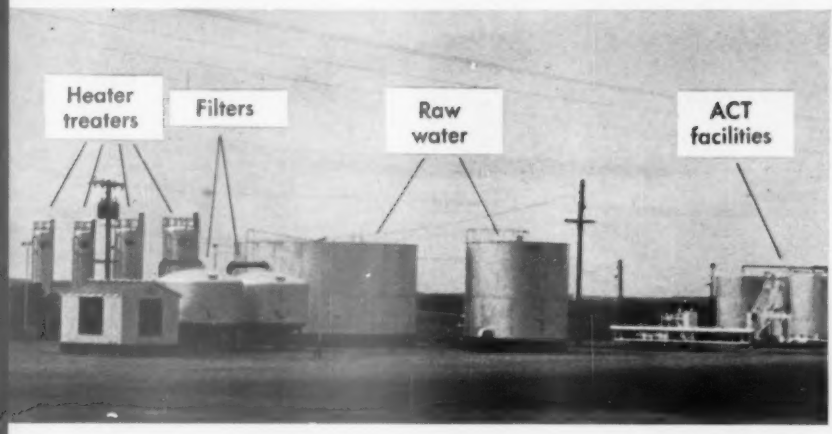
How unitized. Northeast Purdy units, operated by Cities Service Petroleum Co., produce from the Hart and the Springer formations in Garvin County, Oklahoma. The Hart is a clean sand with about 13% porosity, 28% connate water, and a permeability of 11 md. Average thickness is about 18 ft., including the gas cap.

Springer sand porosity is close to 14%, connate-water saturation is 13.5%, and the permeability is nearly 67 md. Average thickness is about 40 ft., and there is a small gas cap present.

Unit boundaries in the field are controlled by productive limits as shown on the map. The Hart zone, at 8,500 ft., is continuous, but the Springer, at 5,900 ft., has a permeability barrier that meant breaking the sand up into two separate producing units, A and B.

All wells in the field are on 40-



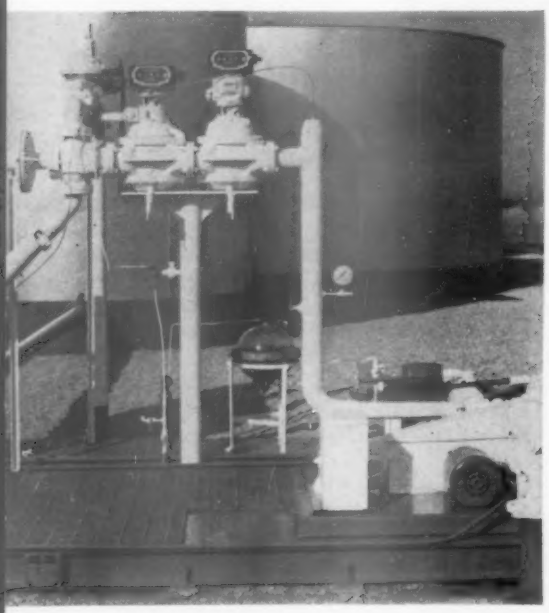


• Here's how a multipay field has been automated. There are probably more different types of operation here than in any other single unitized project. This article tells what has been done to keep operating costs down while increasing ultimate recovery.

acre tracts. There are 560 of these tracts in the Hart unit, 254 in the Springer "A," and 64 in the Springer "B."

In the area where the Hart unit is underlain by the Springer, water-injection and oil - production wells are on a nine-spot pattern, and in other parts of the field where only the Hart is productive, a five-spot is used.

Injection of water into the field for pressure maintenance, and the work of putting the field on automatic operation has been divided into several stages or phases for convenience. The first stage is now complete, and the operators are preparing for the remaining stages. In the meantime, the behavior of that part of the field already under the influence of injected water is being observed so that changes may be made in the over-all plan if they are indicated.



ACT EQUIPMENT for two units is shown here. Tankage is available for holding oil for a minimum of 2 hours' detention time, and for 24-hour capacity of bad oil rejected by the b.s. and w. monitor. Long horizontal pipe in foreground of photo on opposite page is the meter prover (see text). Closeup (immediate left) shows the two p.d. meters in series, the sample chamber, and the electric motor used to drive the chemical pump. This pump is in operation only when oil is being cycled through the bad-oil treater after rejection by the b.s. and w. monitor.

Dual completions. Because there are units on top of units, there are 240 dual completions in the field.

And these dual completions represent almost all possible combinations of gas wells, oil wells, and water-injection wells.

Basic plan of operation of the field is to inject water for pressure maintenance, and to automate as many production functions as necessary to economically produce the reservoirs to depletion.

Test Stations

Called satellites by the men in the field, the test stations perform initial metering and separation functions.

Each station has a production header, a positive - volume three-phase metering separator, a line heater, a gas-test loop, and a production separator. Gross production from the station is measured by a p.d. meter.

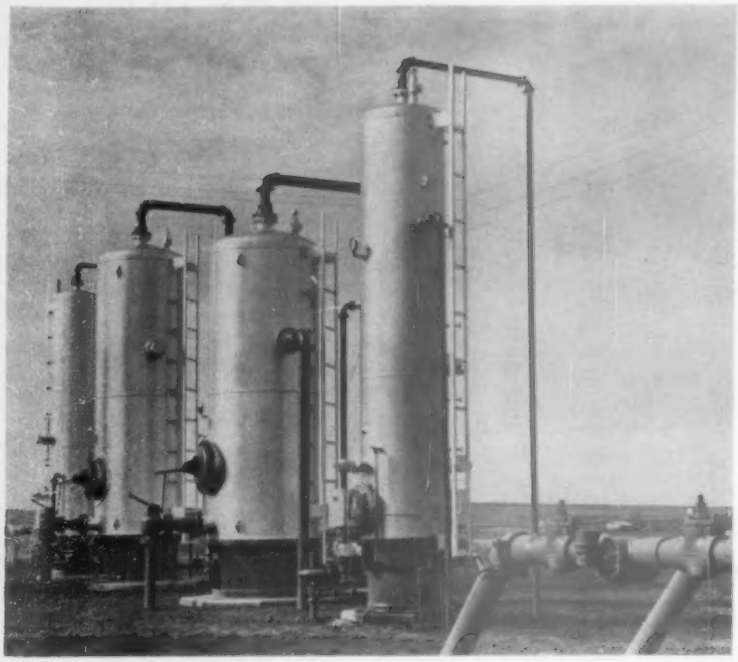
There are no treaters at the test station. All treating is done at the four ACT locations.

Individual well production is not metered, but is prorated back to the wells on the basis of well-test information. Testing is not automated, yet. An economic study is being made of this part of the operation, and if found feasible, automatic equipment will be installed. Automatic header valves are already in place if needed in the future.

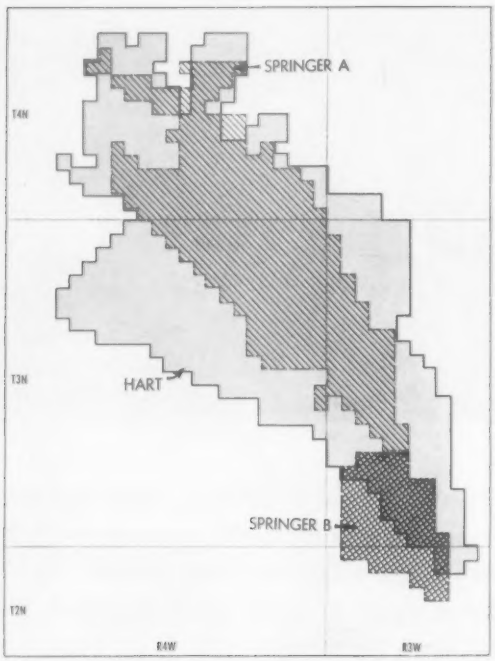
Dual stations are those that handle production from two units, the Hart and one of the Springer units. These stations are identical to the single stations except that there are two of everything.

Wells supplying the test stations with oil are produced by artificial lift, and practically every type of lift mechanism is being used. There are beam pumping units, wells on gas lift, and wells being produced by hydraulic pumps. Only thing missing is the downhole centrifugal pump, and this type is used in the water-supply wells to be covered later.

Each test station takes production from a number of wells determined by capacity of the equipment, potential of the wells and convenience of location.



DUAL STATION SEPARATORS handle production from two units, the Hart and the Springer "A." From left, these separators are for Springer "A" well test, Springer "A" production, Hart production, and Hart well test. In the foreground is part of one of the flow manifolds, showing the turbine-type meter.



NORTHEAST PURDY FIELD, Garvin County, Oklahoma, is producing from three separate units as shown. The Hart zone, at 8,500 ft., is continuous, but the Springer, at 9,500 ft., has a permeability barrier that required division into two units.

Gas from the production separators at the satellite stations is sold in a low-pressure wet condition to the Warren Petroleum Co. Garvin City plant and to the Phillips-Magnolia Bradley plant.

ACT System

Four separate automatic-custody-transfer points are located in the field. Four pipeline companies are taking crude from one or more of the custody-transfer points.

Treaters for the field's production are located with the ACT equipment. There are two treaters for delivery from each unit. One of these is the production treater and the other is the bad-oil treater that handles fluid rejected by the b.s. and w. monitor.

The ACT installations are of the p.d. meter type, are skid-mounted, and were designed by unit engineers.

Each unit has two p.d. meters in series. One, the sales meter, is temperature compensated, and has a flow-rate sensing device that will shut down the production in case of trouble with the meter register. The other meter is not compensated, but has a continuous temperature-recording and averaging device. If the sales meter fails, the other can be used to find the volume delivered.

Units have a capacitance-type b.s. and w. monitor that will divert production to the bad-oil tank in case it fails to meet pipeline specifications. There is enough bad-oil storage capacity to take care of production for a 24-hour period. Upper and lower-limit switches on the bad-oil tanks operate transfer pumps and chemical pumps to route bad oil back through the bad-oil treaters.

Transfer rate has been adjusted to production rate from the unit in such a way that there is a 2-hour minimum detention time in the system's surge tanks.

Most unusual feature. Meter proving at the Northeast Purdy ACT units is done with a piston-and-cylinder-type prover.

A section of pipe, 10 in. in diameter and about 50 ft. long, has been carefully insulated. Microswitches are located at the ends of a 30-ft. section of the pipe, and the volume inside the pipe between the microswitches has been calibrated. A pig inside the pipe is pumped back and forth by switching valves in the prover manifold. When the pig passes each microswitch the direction of flow is reversed. Oil in the prover that is swept out ahead of the pig has already passed through the ACT meters. The meter reading for one round trip of the pig is compared with the known volume swept out of the prover, the oil being corrected for temperature.

With this setup, both meters in the system can be proven in about 30 minutes' time.

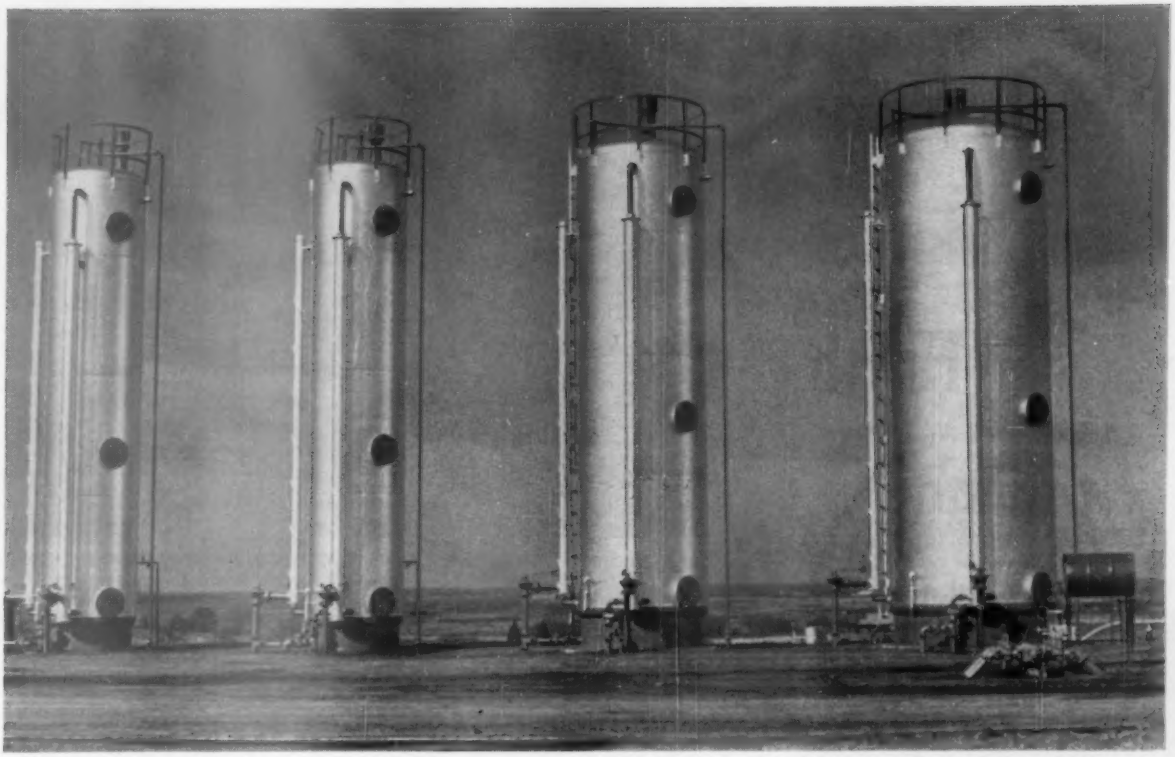
Water Injection System

Water for the field-wide pressure-maintenance project is handled by three water plants at convenient field locations.

Water is produced by submergible centrifugal pumps from five supply wells completed in the Permian water sands at a depth of 4,000 to 5,000 ft. There is about 350 ft. of productive sand, and the water has a specific gravity of 1.15.

Produced water at each station goes to a raw-water tank equipped with a high-level control. When the tank is full, the supply wells are shut down till some of the water has been used.

Charge pumps pick up the water



DUAL STATION TREATERS like these are found at each of the ACT points in the field. At far left and right are treaters handling production from the Hart and Springer "A" units, respectively. Center treaters are bad-oil treaters that take care of oil not passed by the ACT monitors.

from the raw-water tank and transfer it, through filters, to the clear-water tank. Fluid-level switches in the clear-water tank control the operation of the charge pumps.

From the clear-water tank the water goes to gas-engine-driven triplex pump, into a high-pressure header, and then to the main trunk system.

There is an automatic bypass valve that is operated by fluid levels in the clear-water tank. If the level gets too low, the engines driving the triplex pumps are throttled down, first, and a further drop in water level causes the bypass valve to open. This valve permits water to be circulated back to the clear-water tank, so the engines are running at all times. Without this valve the pumping engines would be shut off when the water level got too low, and this would mean a trip to the plant site to go through the troublesome job of putting the engines in operation again.

Automatic backwash. Each water plant uses two filters that are normally operated in parallel. When the pressure drop across the filters exceeds the maximum permissible figure, the backwash cycle automatically starts.

The backwash pump picks up water from the clear-water tank, and backwashes the filters one at a time. Automatic valving keeps one filter in service during the backwash cycle.

Backwash water goes to the waste-water tank where it is allowed to settle before being mixed with the raw-water system.

The backwash cycle is controlled by an automatic timing device that keeps each filter backwashing long enough to clean it. When this time has elapsed, the control automatically returns that filter to service, and puts the other on backwash for the same length of time.

Closed system. The entire water system is protected from the atmosphere to keep oxygen out of the water. A gas blanket is kept on all tanks. No chemicals are used in the water, but the tanks are equipped with carbon anodes for corrosion protection.

Triplex pumps and the direct-connected gas engines driving them are equipped with an automatic oil system to maintain crankcase oil at the required levels.

Common trunk lines are used to distribute water to the three units. This has reduced the amount of pipe needed, and has sharply cut material costs. Injection pressure is about 1,500 psi., and the volume put into each well is measured with individual p.d. meters.

Raw water from the supply wells is measured by an impeller-type meter that is periodically checked by producing into the raw water tank, and taking before-and-after tank gages.

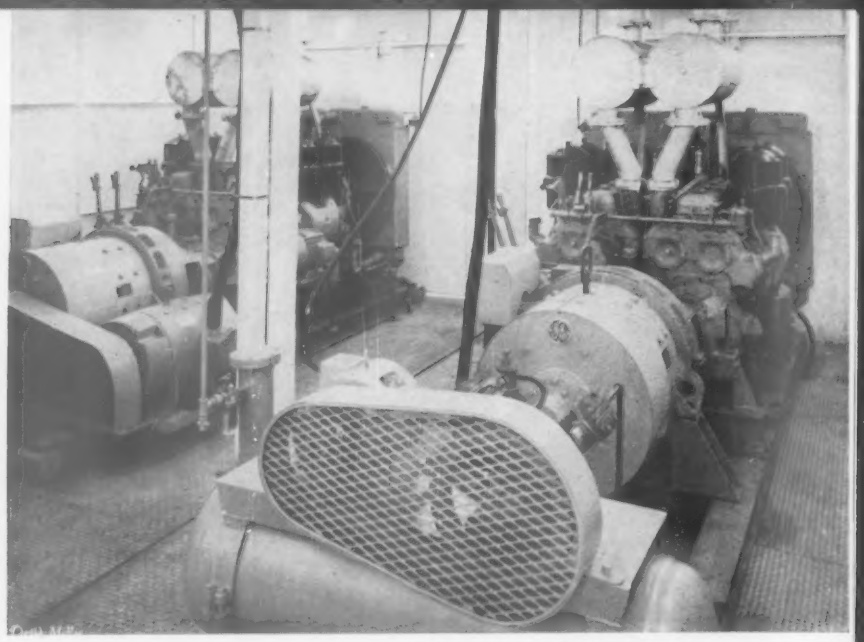
One more water plant is in the planning stage, and will be completed when the second phase of the field operation is started. This will bring the total up to four plants.

Participants

Major companies sharing in the units, besides Cities Service are: Phillips Petroleum Co., Superior Oil Co., Mobil Oil Co., Pan American Petroleum Corp., Sinclair Oil & Gas Co., Continental Oil Co., Sunray Mid-Continent Oil Co., Vickers Petroleum Co., Inc., and others.

Cascade tries

Diesel-electric rig for Far North drilling . . .



TWO ENGINE HOUSES IN ONE; though Nos. 1 and 3 motor-generator sets are on separate skid mounts for moving, they join into common unit for drilling. Twin diesels are direct connected to d.c. generators. Exciter mounts on far generator. Air compressor is in foreground.

. . and likes it. It lends itself easily to winterizing and to air transport

BY R. H. BULLIED
General Manager, Cascade Drilling Co., Calgary

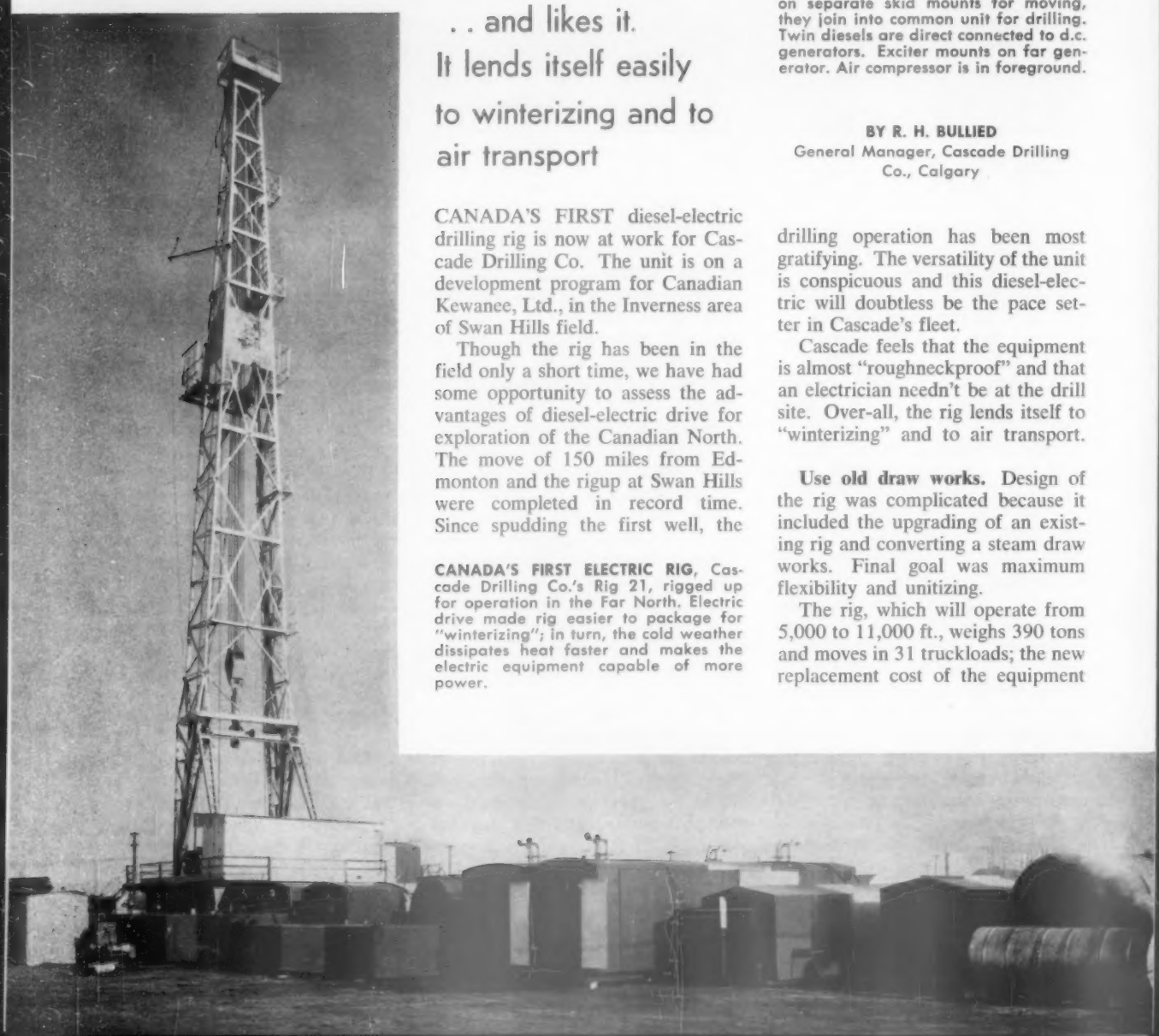
CANADA'S FIRST diesel-electric drilling rig is now at work for Cascade Drilling Co. The unit is on a development program for Canadian Kewanee, Ltd., in the Inverness area of Swan Hills field.

Though the rig has been in the field only a short time, we have had some opportunity to assess the advantages of diesel-electric drive for exploration of the Canadian North. The move of 150 miles from Edmonton and the rigup at Swan Hills were completed in record time. Since spudding the first well, the drilling operation has been most gratifying. The versatility of the unit is conspicuous and this diesel-electric will doubtless be the pace setter in Cascade's fleet.

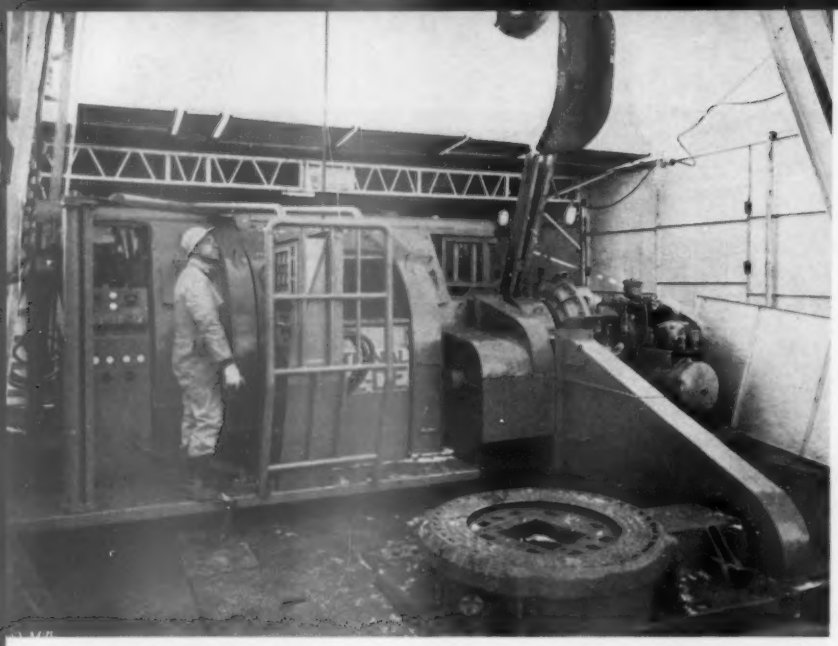
Cascade feels that the equipment is almost "roughneckproof" and that an electrician needn't be at the drill site. Over-all, the rig lends itself to "winterizing" and to air transport.

Use old draw works. Design of the rig was complicated because it included the upgrading of an existing rig and converting a steam draw works. Final goal was maximum flexibility and unitizing.

The rig, which will operate from 5,000 to 11,000 ft., weighs 390 tons and moves in 31 truckloads; the new replacement cost of the equipment



CANADA'S FIRST ELECTRIC RIG, Cascade Drilling Co.'s Rig 21, rigged up for operation in the Far North. Electric drive made rig easier to package for "winterizing"; in turn, the cold weather dissipates heat faster and makes the electric equipment capable of more power.



CONVERTED DRAW WORKS is old steam unit converted to electric-motor drive. Same motor drives rotary that drives draw-works drum but split-shaft arrangement makes it possible to drill with rotary without turning draw-works shaft. Remainder of rig is converted from mechanical drive.

is estimated at $600,000. The rig is designed with air transport in mind; the tremendous cost of providing roads to remote locations makes it necessary to plan for this eventuality. The heavy rig can be broken down into components that can be transported by air.

Winterization of the rig is simplified by using individual permanent housing of all units except the rig floor. Housing for the draw works and rig floor is made of prefabricated panels. Steam heaters are permanently installed in all units except for the rig floor and these are readily installed. The substructure is permanently enclosed on the sides and prefab units complete housing-in on the ends.

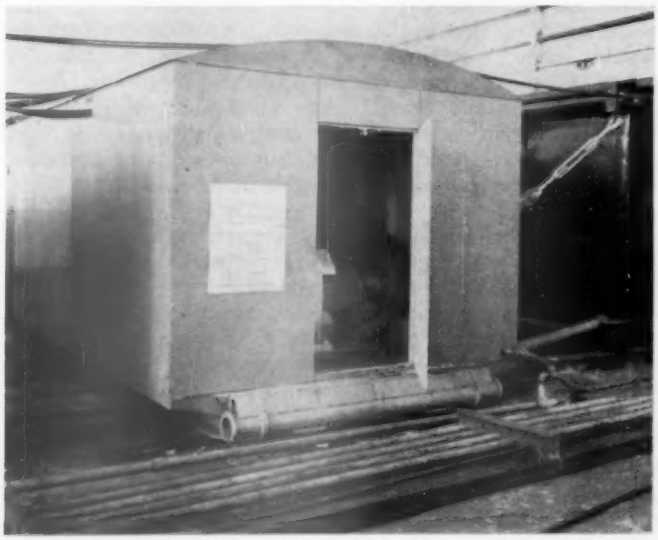
Power unit. Main power supply comes from four sets of twin GMC 6-71 diesels driving four GE 558-S direct-current generators. In this service, the engines are rated at 290 hp. at 1,800 r.p.m., or a combined power of 1,160 continuous horsepower. This arrangement was chosen for maximum flexibility of power assignment. All units are run at constant speed.

The units are mounted on two housed skids each containing two motor-generator sets. During moves, each skid is one load. If loads must be lightened, each motor-generator set is skidded independently and moved separately.

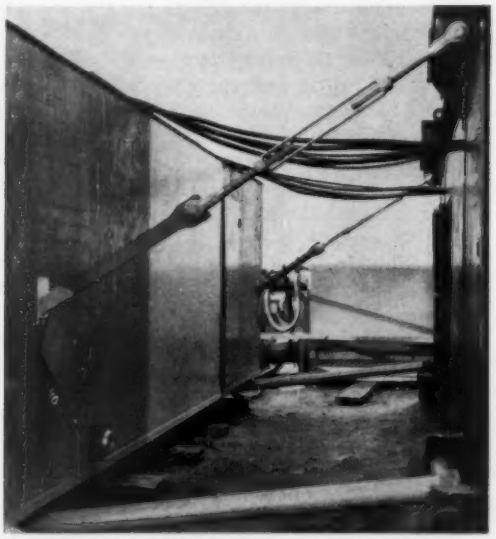
The motor-generator sets on No. 1 skid each have an exciter mounted as an integral part of the unit. This skid also has the main control panel. This permits permanent wiring of these units to minimize the electrical rigging to be done during moves.

To insure continuity of operation, full standby provisions have been made. All electric motors drive through a standard fast coupling so they may be interchanged easily and rapidly in the field. The power unit is flexible in that when one unit goes down, effective power is reduced only 25%. The a.c. power supply on the standby unit is adequate to operate all essential equipment for an unlimited time.

Cascade feels this rig will operate continuously without mechanical or electrical breakdown for sustained periods, down time being confined almost entirely to general overhauls.



WINTERIZED MUD PUMP makes convenient package for moving. This unit is 700-hp. model which can take power from three generators for drilling. If smaller pump (in a similar house to the right) must mix mud while drilling, it gets power from same generator that operates the rotary.



COUNTERBALANCE PROBLEM is solved by using these two spacer bars and two adjustable rods to connect the draw works-derrick substructure with the main-pump skid. Then, there is sufficient weight on the rear of the substructure to offset the weight of the mast as it is raised or lowered.

Equipment was chosen and units spaced emphasizing fast move, rigup, and teardown.

Draw works. The draw works is a converted National steam unit, Model 34-27-9 DMB. The electric motor (GE 752-R) is mounted on the draw-works skid on the offdriller's side. This arrangement permits the draw-works unit to be moved in one load. So that the draw works need not run while drilling—except for connections—there is a double sprocket in the motor drive shaft. One sprocket drives the draw works for hoisting and connections; the other drives the rotary table. A rotary countershaft reduces speed to nominal table speed.

When drilling, only one generator need be assigned to the draw works motor giving the ultimate in table-speed selection. There is also a three-speed selector on the draw-works motor. As a result, the driller can obtain a combination of table speed and torque desired for any condition.

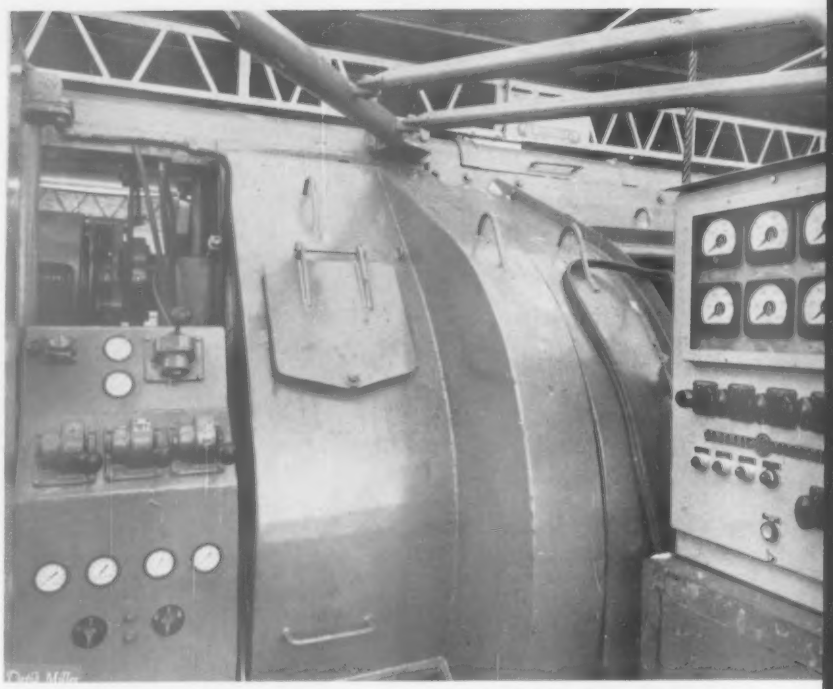
During hoisting operations three generators may be assigned to the draw-works motor for maximum efficiency during trips.

Pumps and a.c. power. Each pump is unitized with a GE 752-R electric motor, mounted on the pump skid. The unit moves in one load.

The main pump is a National G-700 driven through a chain drive. When drilling, three generators will be assigned to this unit so that it is possible to operate the pump in any manner within the manufacturer's specifications.

The standby pump is a National C-250 driven through a chain drive. If it is necessary to use this pump for conditioning mud, power comes from the generator driving the draw-works motor. The pump is also adequate for drilling if repairs are necessary on the main pump; in this instance two generators will be assigned for power.

A.c. power is furnished by a 50-kw. generator driven through a fast coupling on the tail shaft of a d.c. generator. This is possible because our diesel power units run at constant speed (1,800 r.p.m.). There is also a standby a.c. generator of 30-kw. capacity which was original equipment before conversion.



MONITORING THE RIG is an easy matter with the driller's instrument-control console. Voltmeter readings are proportional to motor speeds on draw works and pumps. Ammeter readings are proportional to motor torque; multiplying the two gives horsepower. Controls are pressurized to be explosionproof.

Substructure counterbalance. There is a problem in the electric rig using a jackknife derrick: There must be a means of counterbalancing the unit while raising and lowering the derrick. The National G-700 located directly behind the substructure is used for this purpose; two adjustable steel rods and two spacers connect pump skid and substructure. This design has proved very effective as a counterbalance.

One of the major considerations in recommending to management conversion to diesel-electric equipment was the long-range economics.

Many advantages. There are a number of advantages to electric drive in far-north areas. The low ambient temperature dissipates heat more rapidly, and raises capacity of electric drive. Result is higher overall efficiency which can be translated into fuel savings. This eases the logistics problem.

The rig loads are permanently unitized and are separated easily into packages for easiest handling. This same unitized, permanently housed package approach speeds rigup, move, and teardown time. Each unit may be positioned as it arrives on location, thereby reducing truck time and manpower hours to a minimum.

Site preparation is less critical because alignment of equipment no longer remains the problem it was with mechanical rigs. Equipment can be located where convenient and easily connected by cable.

Down time is virtually eliminated due to the flexibility of power assignment. This means faster completion of the hole.

Cascade believes there will be little need for investment in spare parts. Any parts needed and a factory-trained technician are available in Edmonton.

In contrast to straight diesel or gas-powered mechanical rigs, the diesel-electric rig has a complete range of speed for draw works, pump, and rotary table. There is flexibility of power assignment; one, two, or three generators may be assigned to any motor. Hence, each pump and/or draw works may have its individual power supply giving table speeds, pump performance, and draw-works combinations unlimited variations. Electric drive offers the ideal conditions for the recently developed drilling techniques of variable speeds and weights on bit.

"Rig loads are permanently unitized . . . for easiest handling."

Other expected advantages are: lower maintenance and lube cost of power transmission; less total rig weight since there is no compound and since substructure is smaller; fuel should be cheaper since use of power is more efficient.

For Safe Operation

The system has a number of safety features. For instance, the remote location of diesel motors makes it possible to carry on normal conversation on the rig floor. As a result, the men can hear better and carry out their duties more safely.

Also if there should be gas around the hole the draw-works motor can be ventilated from a remote point through a duct. Moreover, the driller's console is slightly pressurized by an air-hose connection, thus leakage is always outward.

Ground relay. To prevent arcing, main power circuits are grounded through a relay which removes all power in event of an electrical fault to ground. This relay signals the driller by lighting a light on the console. If the fault is momentary, the relay can be reset and operation resumed.

If the fault continues, the faulted portion can be isolated and operation resumed with the remainder. Or in emergency, the ground relay can be removed from the circuit and operation resumed until the hole is safe to shut down for repairs.

Emergency console cutout. Since the driller's console is on the rig floor, there is an emergency switch in the control compartment on power skid No. 1. This switch makes essential power-assignment functions in event of damage to the console or its connecting cables. Suppose the driller's controls fail to operate due to damage or malfunction. It is necessary merely to unplug its three connecting cables at the power skid, then the emergency switch can assign power to continue operation until the console is repaired. Both drilling and hoisting assignments are provided.

Motor cutouts. There are cutout switches on each electric motor. These isolate the particular machine from the rest of the system. Thus the driller cannot start a motor while its connected machine is being worked on.

Engine safety switch. The circuitry for each generator is interlocked through a switch on its engine. This switch isolates the generator if oil pressure is too low, if water temperature is too high, or if the engine overspeeds.

Indicating meters. In addition to the generator-assignment switches and the draw-works-motor speed-selector switch, the driller's console carries a voltmeter and ammeter for each motor. The voltmeter reading is proportional to motor speed; it can be interpreted in terms of pump strokes, line speed, or rotary r.p.m.

The ammeter reading is proportional to motor torque; this indicates pump pressure, line pull or rotary torque.

For either motor, the product of volts and amps is watts, which, divided by 746, gives horsepower. Thus the meter readings can be used to monitor the drilling operation. Any abnormal condition can be detected at a glance.

Blower lights. The driller is warned of loss of ventilation on the electric motors by lights on the console. A horn blows if power is applied without ventilation.

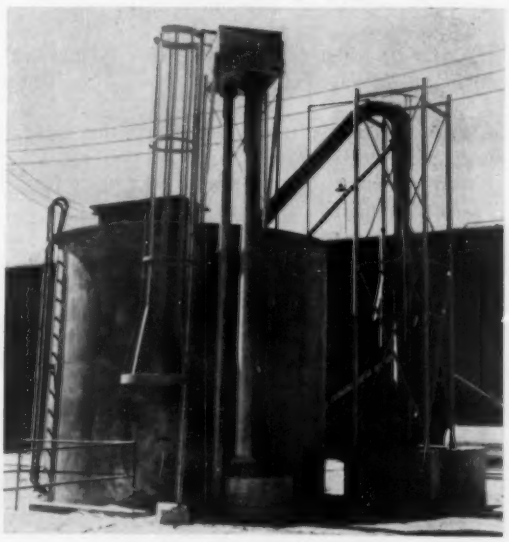
Emergency stop. A push button on the console can be used to remove all power in emergency. The crown stopper is installed to operate the emergency stop when activated as well as the draw-works brake. All throttles must be returned to the off position to restart.

Personnel. The conversion to diesel-electric power for Cascade has been a major step. However, it is only an assembly of machinery until trained personnel convert it into an efficient drilling rig. Crews that were to operate this rig were brought in from the field to assemble the component parts into the finished product. All hands were given instruction in the operation and care of the equipment. Instruction was given by manufacturer's representatives and company supervisors during the time the rig was assembled, thereby giving the crews first-hand experience and a working knowledge of the equipment.

Automatic filter for cooling tower

SILT in the cooling-tower water of a Texas Panhandle plant has been virtually eliminated by Phillips Chemical Co. by the use of a special automatic valveless gravity filter made by Permutit Co.

Before installation of the new equipment, the water contained about 2.0 p.p.m. of silt which deposited in piping and heat-exchange equipment resulting in poor heat transfer, biological fouling, and corrosion. The new filter backwashes itself without control valves.



The subject:

Problems in cat reforming

BANKS: How much splitting of the charge to reformers by prefractionation is practiced?

BROWN: We dehexanize the charge before Unifining. After Unifining we go through a fractionator for Platformer-charge end-point control. We will soon embark upon a considerably different operation as we put another new reformer on the line. We will feed-split the dehexanized material approximately in half. The heavier 300°-400° F.-range material will go to one reformer operated for about 102 RON + 3 ml. TEL. The lighter 200°-300° F. material will go into a lower pressure unit to produce about 104 RON + 3 ml. TEL. We expect by this feed split to gain considerably in yield on these light fractions. We expect to gain 3 to 4% in yield over a high-pressure operation.

BROOKS: On most Ultraformers we prefractionate the feed. Frequently we take both the top and bottom fractions off to tailor both the initial and the end point of the charge to the reformer. In some cases we only take the top portion off to dehexanize. In almost every case there is some prefractionation of the feed.

BANKS: What alloys are being used to prevent carburization and embrittlement in reformer lines that carry hot hydrogen-rich gases? What is service life in such lines?

DOYLE: We use 1.25 chrome - 0.5 moly and 2.25 chrome-1.0 moly at Ingram. We have not had any significant metal loss in our 4 years of operation. We presume that this is going to have as good a service life as the rest of the equipment in the refinery.

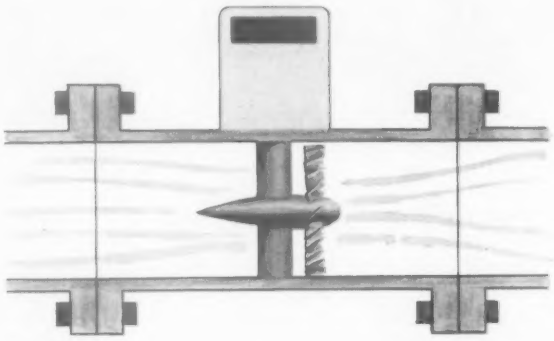
HANDKE: Most of our lines such as this are 4-6% chrome. We have had no failures in these systems.

KOPF: I presume the question actually means decarburization; carburization would be unlikely. Decarburization and embrittlement would take place from hydrogen diffusion. If it is just hydrogen, 1.0-2.25% chrome offers good resistance to the diffusion. If you have hydrogen combined with H_2S in the range of 0.2-0.5%, then a higher chrome material is required to combat the corrosive sulfide as well as the diffusion. Low chrome could be used with aluminized coating in the piping in the furnace. A great deal has been written in the literature on this subject and I have a great many references. If anybody wants them I can supply them later.

PARKS: Continental has had perfectly satisfactory service using low-chrome alloys based on the hydrogen partial-pressure-temperature relationships given by the Nelson curve. (OGJ, May 25, 1959, p. 160.)

BROOKS: We follow the recommendations of the Nelson curve religiously, because we have had a failure from hydrogen embrittlement. We feel it is important to keep equipment at conditions which match up with these Nelson curves.

PATTERSON: Our experience parallels exactly that described by Fred Kopf.



T. B. KELLY (Pontiac Refining Co., Corpus Christi): I would like to ask some of these people who have positive-displacement meters for cost figures. Have they been able to get the things to run satisfactory from a maintenance point of view? We were able to get them within 1%, but we can't keep the meter on stream more than about 2 or 3 weeks.

BROWN: We have displacement meters in a great many services all the way from crude to light ends. We have a great many in our gasoline-blending systems. They are somewhat expensive to maintain. We are switching to turbine meters in some of these services, and are having fine results in terms of maintenance as well as reproductibility.

C. L. CALDWELL (Union Oil Co. of California, Rodeo, Calif.): At our Oleum refinery we have a turbine meter which measures the stabilizer bottoms stream. It is relatively new. We have had it about a year and we are just now getting all the kinks out of it. From the standpoint of mechanical maintenance it's been satisfactory. We have another turbine meter on the feed to the Platformer. We are now getting to the point where we can rely on these meters and get good daily-yield figures.

The panel:

W. L. Banks

D. P. Handke

O. P. Doyle

L. B. Parks

R. M. Brown

J. A. Brooks

A. C. Patterson

T. J. Oleszko

F. W. Kopf

J. A. Gearhart

Panel members and their affiliations at the annual WPRA meeting in El Dorado were: W. L. Banks, technical director, WPRA, Tulsa. D. P. Handke, Standard Oil Co. (Ohio), Cleveland. O. P. Doyle, Ingram Oil & Refining Co., Chalmette, La. L. B. Parks, Continental Oil Co., Ponca City, Okla. R. M. Brown, Union Oil Co. of California, Wilmington, Calif. J. A. Brooks, Standard Oil Co., (Ind.), Whiting, Ind. A. C. Patterson, Esso Research & Engineering Co., Linden, N. J. T. J. Olescko, Aurora Gasoline Co., Detroit. F. W. Kopf, Atlantic Refining Co., Philadelphia. J. A. Gearhart, American Petrofina Co. of Texas, Mount Pleasant, Tex.

BANKS: I would like to ask Bob Brown if he could justify the extra expense and extra maintenance in this particular application?

BROWN: That's difficult to answer, but let me look at a daily plot I have here of weight recoveries. These are from a reformer using orifice-meter measurements. We consider the orifice meters in this plant good to 2%. The variance in calculated gasoline yield is 1%. It represents a 1% variation from day to day in yield. And this still doesn't represent the absolute value. When you are that far off, you can justify a good measurement as a basis for catalyst regeneration or replacement and to optimize unit operation. As far as the cost of maintenance, I, too, might have a reservation if we were talking displacement meters only.

Our belief is that the turbine meter will give good service even in process units. We have an 8-in. turbine meter, on a cold gasoline stream, through which we have metered 5 million barrels without any problem at all. We have had turbine meters in tetraethyl lead service and they, I think, are more reliable than the scale.

HANDKE: On two of our units twice a week and on one of our units three times a week, we try to get an envelope, so to speak, around the unit where we get all analyses. At the same time, we get temperatures and pressures of the streams so that we can correct our meter factors. In this manner, over a period of a month we get anywhere from 8 to 10 pieces of data for comparing one month's operations to the next month's operations. And we feel that 1% yield variation would be significant. We don't use any of the pieces of data unless they are within plus or minus 2% of 100% weight balance. By being selective, we keep the system in a repair so that we can get a weight per cent balance. We have, in this manner, a better handle on it than trying to run 8-hour tests every so often. We just don't believe these spot tests anymore. We would rather do a series of such as we are doing now to get an average or composite and use that to determine where our yields are.

DOYLE: We are hoping to install an IBM 1620 computer and to incorporate in its program a daily-yield structure, corrected orifice-meter factors based on temperature, gravities, etc. The same on all tankage. We anticipate using the computer to work up a daily-yield weight balance within 98% on all units. I think all of these yield variations that are due to something else will show up on a plot.

BANKS: Has anyone experienced degradation of Pt catalyst during regeneration by sulfur compounds (e.g. SO_2)? If so, what preventive measures have been taken?

BROOKS: This sort of problem can occur in regenerating platinum catalyst, particularly if sulfur in the system is high and iron is present. When the iron sulfide is burned, SO_2 is formed which will combine with the catalyst and give deactivation. In our regenerative reforming process this occurred until we put in desul-

furizers. Two of our early units actually started without desulfurizers and we got into sulfur problems. We put a desulfurizer on a couple of years later and at least one of them is still running with the original catalyst. The number of regenerations is over 200.

BANKS: Does separator temperature have any effect on reformer performance?

BROOKS: Yes, it does affect it. Lower separator temperature will reduce the amount of hydrocarbons in your recycle gas. This gives a recycle gas which is richer in hydrogen; therefore it is more effective in minimizing coke level in the reformer.

KOPF: I'd say the same thing. Purity does decrease with higher separator temperatures and more impure gas does increase the horsepower requirement on the compressors. We make ammonia out of the hydrogen and we have to purify it. Naturally we want the highest purity we can get to minimize the load in the ammonia plant.

PARKS: The C_5+ losses in the separator tail gas will go up with higher temperatures. Furthermore, vapor-liquid equilibrium data that I've seen for hydrogen, certainly in some temperature ranges and perhaps in the separator temperature range, indicate an adverse relationship with temperature. Thus, if the separator temperature rises, you may increase the amount of hydrogen in the separator liquid and the possibility of condensation difficulty in the stabilizer overhead system.

L. P. EVANS (Socony-Mobil Oil Co., Inc., Paulsboro, N. J.): I wonder if some of the members of the panel would comment on just how low a separator temperature they consider desirable to get good catalyst life, etc. I think the remarks thus far have been rather general. It would be interesting to quote some figures along this line. For example, most operations are in the 90° to 100° F. range. Is anyone operating in the range of 50°-60° F. or even lower?

DOYLE: I don't know how low would be the best. It would seem that the lower it is the better it is. We have had a spell of 120° F. operation and we had a short life. We don't recommend this. We don't intend to repeat it. Some pilot work indicated that there was a severe effect on catalyst life due to separator temperature. We attributed this to carryover of small quantities of full-boiling-range material. You really have a coke maker with this material. The lower you can keep this the better your catalyst life will be. I wouldn't go over 90° F. if I could help it. We run in the range of 90° to 100° F.

BROOKS: Likewise.

KOPF: We also are in the same general range. We like it as low as we can get it.

CALDWELL: I think maybe we have a record. We have operated up to as high as 135°-140° F. We have been studying this situation for many months and are now planning to put in additional cooling bundles. But we had a hard time justifying it. We expect the new bundles will enable us to operate at about 100° F.

GEARHART: I would like to suggest that the economics of increased compressor horsepower requirements resulting from higher separator temperatures should also be considered in the justification for additional cooling surface.

KOPF: We don't think that hydrogen purity has any noticeable effect on catalyst unless you are above the 95-RON clear-octane level of operation.

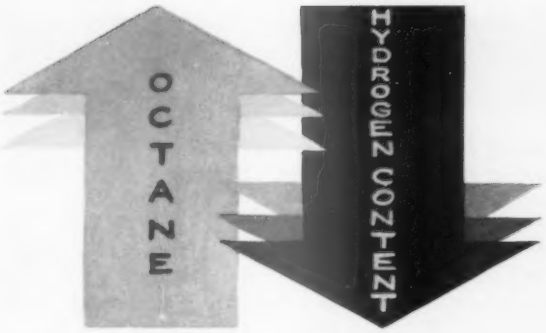
DOYLE: I would like to know what hydrogen purity you are operating at with the 135° F. separator temperature?

CALDWELL: Well, it gets down toward the end of the run to about 73%. As I recall, at the beginning of the run it is up around 85%. We operate at two severities. The low-severity operation is about 96-RON leaded with 3 ml., the high-severity operation is at 100 RON leaded with 3 ml. Both of those numbers refer to total reformate.

BANKS: What is a safe minimum level for hydrogen concentration in reformer recycle gas?

DOYLE: I would say that 75% is a pretty minimal hydrogen level. I have seen units operate successfully at 65-70%. The lowest absolute that I have seen was 38%, but it just flat died. I think per cent hydrogen does have an effect on catalyst. If nothing else, it just helps you keep clean.

R. G. ALEXANDER (International Refineries, Inc., Wrenshall, Minn.): We've run our reformer blocked out on various operations and it seems to me that this is one of the biggest things that you have to watch. You always talk about hydrogen purity but what octane level are you at? You start changing octane level and the hydrogen content is going to change also. You raise octane level and hydrogen content is going down. Then there is the catalyst condition. We have had catalyst deactivation for reasons which were not apparent to us. We normally run, say, a 95-RON octane level and we can get about 78.5% hydrogen in the separator, and that's running a 350-psi. separator. We did have some problems, and we don't know where they



came from or if we have got rid of them or not. With the same octane level and the same pressure, the hydrogen content dropped down as low as 67-68%. That apparently is a function of the catalyst more than anything else.

KOPF: As this conversation has gone on here, I thought it would be a good idea to point out that there is a difference in what catalyst you are using as well as the severity of the operation. Some catalysts produce more C_1 and C_2 products than others. With the Catforming catalyst, which has some silica alumina base, we produce less C_1 and C_2. As a result the hydrogen purity is generally much higher. I would say 5-10% higher purity for a given operating severity and separator temperature. So when I talked before about going about 95-RON clear I might be thinking of a higher-purity material than you people may be thinking of with other catalysts.

CALDWELL: One point maybe should be made clear on this high-separator-temperature operation. This 135° F. refers to end-of-run conditions. Normally we start out at a beginning of a run at about 100° F., or slightly lower.

BROOKS: We lost track of the question somewhat. The question was: What is a safe minimum level? The question should be related to the kind of operation. Someone said a minute ago the kind of catalyst was important. I think the operation is more significant; that is, whether this is the nonregenerative or the regenerative operation. Really, it gets down to what is the hydrogen partial pressure which you can tolerate. You have to consider the hydrogen recycle rate, the concentration of hydrogen in recycle gas and the frequency at which you can regenerate. If you can regenerate frequently, you can tolerate a lower hydrogen concentration in recycle gas and a lower gas-circulation rate. Some of our high-severity regenerative units run with 70% hydrogen consistently, without any problem.

ALEXANDER: We have considerable flexibility in our plant because our unit was built for certain conditions which we haven't reached yet. We can vary recycle gas anywhere from 6-20 M.c.f. per bbl. Now is hydrogen partial pressure the only criteria? Can you interchange unit pressure for recycle gas rates while maintaining a constant hydrogen partial pressure and achieve the same results? Or is there some limit on that?

BROOKS: It is difficult for me to come up with an answer to your question offhand. We normally specify a minimum of hydrogen recycle for our regenerative type of operation.

DOYLE: I would be inclined to believe from talking to UOP people that if you could run more hydrogen with your compressors it would be advisable to do so. You could probably get away with lowering your pressure to take advantage of the yield obtainable at the lower pressure. If you run low end-point feed you might go to lower pressure with the increased recycle and improve your yield picture.

KELLY: Is hydrogen partial pressure important in itself, or is the ratio of the hydrogen partial pressure to that of the C_6+ really the criterion to use here?

KOPF: Did you mean C_6+ in the recycle?

KELLY: No, in the reactor.

KOPF: Well, my answer would be it is the hydrogen partial pressure.

PATTERSON: According to studies we've made the oil partial pressure and the total hydrocarbon pressure are both important in affecting rate of catalyst deactivation. By total hydrocarbon partial pressure, I mean all of the hydrocarbons that are in the reactor—those in the recycle gas plus those in the feed.

BANKS: Are there any good data correlating severity level with ultimate catalyst life in regenerative reforming?

BROOKS: Surely as you increase severity, you are going to increase your regeneration frequency. And, of course, with the higher frequency of regeneration you are going to shorten catalyst life. Catalyst will normally be replaced after a given number of regenerations. Our experience in Ultraforming is that catalyst life is in excess of 200 regenerations; currently, 300 regenerations is the range for catalyst replacement.

BANKS: What operating conditions and feed stocks are being used for aromatics production?

PARKS: On benzene-toluene at our Ponca City operation, we charge a 155°-205° F. boiling-range naphtha containing about 64% paraffins, 33% naphthenes and 3% aromatics. We operate at reactor-inlet temperatures of 940°-960° F., 200-psig. separator, and 2-weight-hourly space velocity.

BROOKS: To answer this question specifically, we would have to have better information on what aromatic is desired. But, if you are talking about benzene, the feed should include all C_6's. Generally, on that kind of operation, you might tailor the heavier end point of your feed roughly between 260°-300° F. For this kind of operation you can drop pressure on your unit and get a little higher yield. For benzene

you will probably run at a lower octane, in the neighborhood of 85-90 RON. Higher octane levels will not give you any higher benzene yield. If you are running for higher aromatics, you would move up in the boiling range and not include the benzene formers.

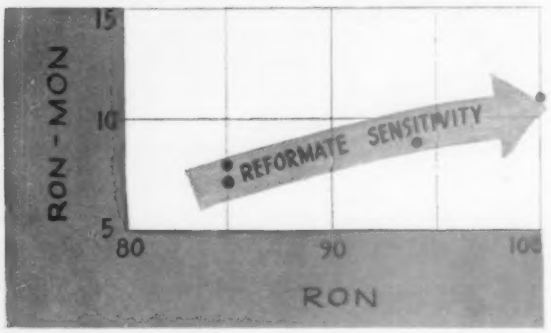
DOYLE: In the aromatic operation, probably the criterion that is most watched would be your last bed temperature. Try to push equilibrium at the lower pressure in the direction of making the most aromatics and this would be at the higher temperature. For feed-stock ranges, if you were operating with benzene you would probably operate in 160°-170° F. end-point class. If you wanted benzene-toluene you would be up to 215°-220° F. levels, and for xylene be on up to 270°-290° F. levels.

O. J. ZANDONA (Ashland Oil & Refining Co., Ashland, Ky.): I would like to ask a question as to your experience with respect to aromatic production in catalytic reforming units. What are the prevailing temperature conditions in Number 1, 2, 3, and 4 reactors? Are the highest temperatures in Number 1 reactor or Number 4 reactor? Does a change in the temperature pattern through the reactor system have any effect on yield or severity of the operation?

BROOKS: Yes, temperature patterns are important on yields. We generally operate the lead reactor with the lowest inlet temperature. The highest temperatures are in the last reactors.

BANKS: Does the sensitivity of reformate get worse as the severity of operations is increased?

BROOKS: I have some data which were correlated from reforming Mid-Continent naphthas in our type of operation. They show a sensitivity of 8 octane units at 85 RON, 10 units at 95, and 11 units at 100 RON.



HANDKE: The information I have shows about a 7.5 sensitivity at about 85 RON and somewhere around 9 at 94 RON. We don't really have enough data higher than that to be conclusive. I would assume, if anything, it would get worse.

BROWN: I concur. We think that we can see the sensitivity worsening at the higher levels.

HANDKE: I also agree that the sensitivity is worse at the clear level than it is at the 3-ml. level. Do you concur with that?

BROOKS: Yes, about a one-number difference.

DOYLE: We have very limited data on this and we found it going both ways. This may be due to differences in feed stock.

BROOKS: The data I reported are based on laboratory reforming studies, with extensive work with one feed stock and elaborate correlations. That is one of the reasons why I indicated at first that it was for one particular naphtha and for our particular type of operation.

BANKS: What is the effect on benzene production of raising reactor pressure 100-200 psi.?

PARKS: We have quite a bit of test data at various operating pressures and have developed correlations which would indicate that (for a given reactor inlet temperature, hydrogen-to-hydrocarbon ratio, and space velocity) the amount of benzene produced would decrease about 4% if the separator pressure is raised from 150 to 200 psig. Benzene would decrease about 9% if raised from 150 to 250 psig.

DOYLE: My numbers are calculated estimates and are lower than that. They indicate 2% loss in benzene yield per 100-psi. change. The change in pressure is somewhat akin to dropping the last bed temperature. I don't really see why a fellow would want to go in that direction if he was designed for low-pressure operation.

CALDWELL: I would gather that the comments on the desirability of the uphill temperature pattern through successive reactor apply to aromatics operation. Does that apply to motor-gasoline reforming, also?

BROOKS: Yes.

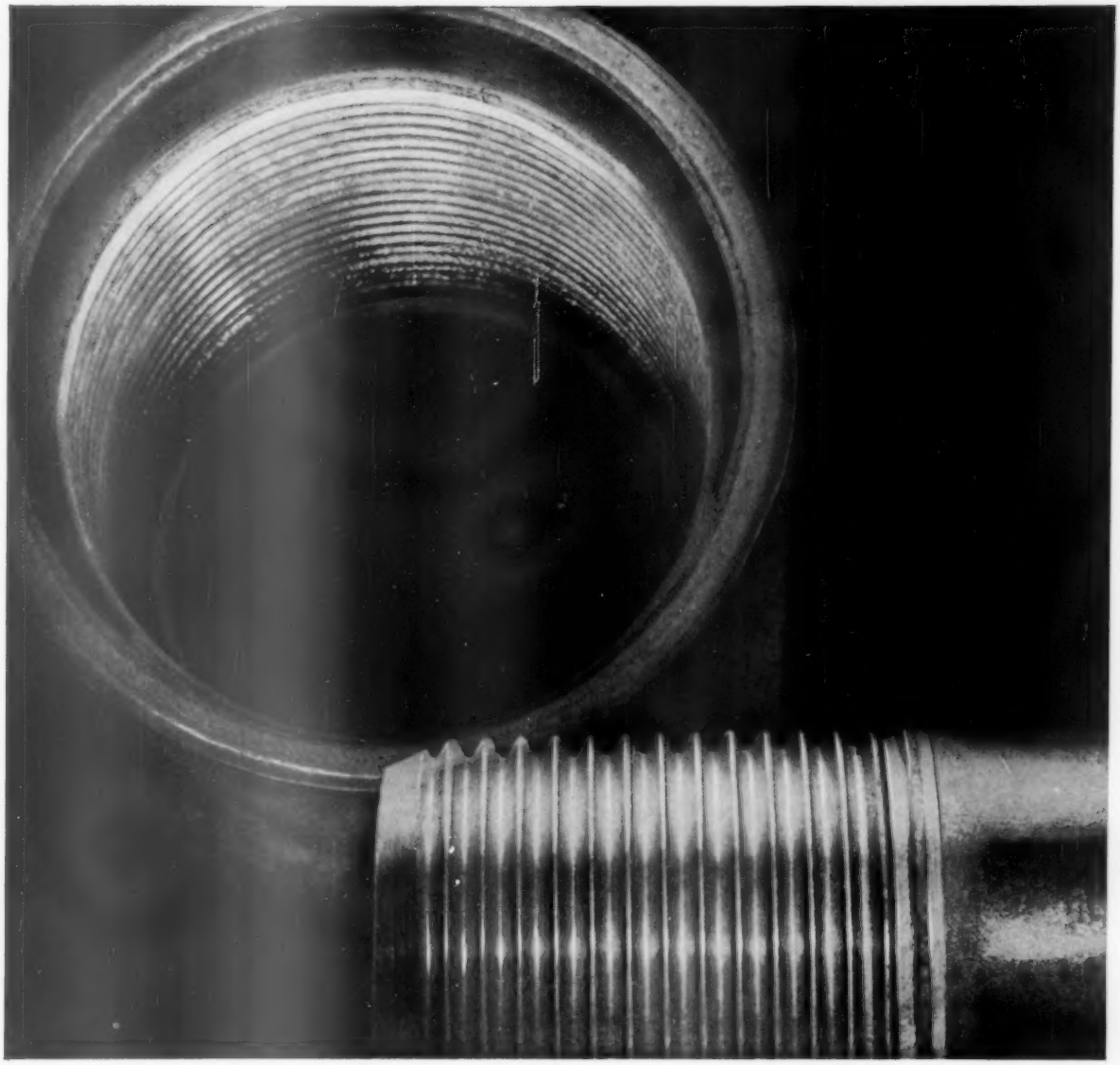
CALDWELL: We run just the reverse—downhill.

BROOKS: Turn it around and see if you don't get an improvement.

KELLY: Are we talking here about average operating temperatures, or about reactor inlet temperatures? We run with lower inlet temperature and higher average temperatures.

BROOKS: Actually it turns out to be both. We start out with low inlet temperatures on the lead reactor and go progressively higher. Average temperatures are also progressively higher.

KELLY: Our temperature drops through the reactor go from generally in the neighborhood of about a 100° F. on the first reactor, 40° F. on the second, and maybe 10° F. on the third ractor. We run with a 10° F. spread in reactor inlets, so we have a declining temperature-inlet profile, but an increasing average temperature across the reactors.



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Sorbead R has a very high capacity for hydrocarbons as well as high bulk density and is exceptionally effective in the recovery of valuable condensable hydrocarbons when used for this purpose. A typical 20 mmcfd unit can produce up to $50,000 per year in additional revenue through such recovery, using Mobil Sorbead R.

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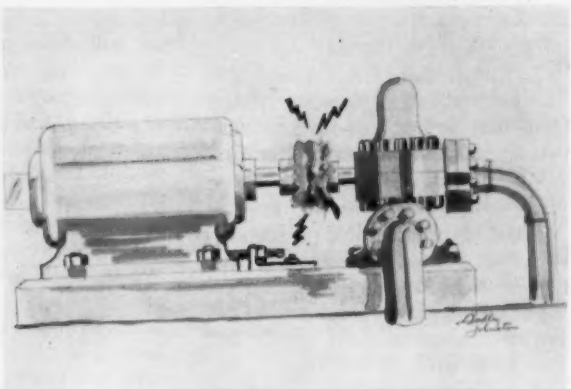
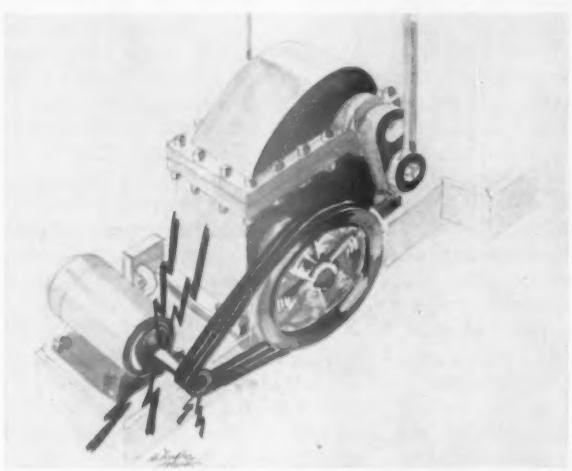
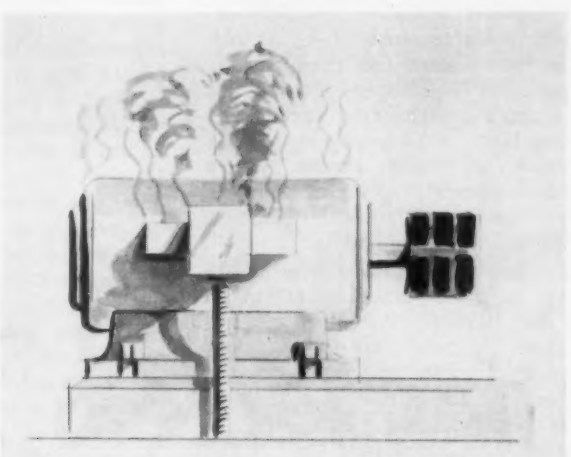


• IMPROPER ALIGNMENT



• OVERLOADED BEARINGS



• DEFECTIVE SAFETY DEVICES

. . . to get top electric-motor service

says a panel of electrical engineers

Electric motors have earned an excellent reputation in the petroleum industry for reliability. Most of the trouble that has been experienced with electric drivers can be attributed to:

- Faulty lubrication practices.
- Improper alignment of pump and driver.
- Overloaded bearings.
- Defective safety and protective devices.

These conclusions were drawn from a panel discussion at a recent AIEE conference of the petroleum industry in Oklahoma City.

Plant Service

Average maintenance cost for electric motors in Humble Oil & Refining Co.'s Baytown refinery has been around $0.50 per horsepower per year, reported W. D. Allison. And the time between forced outage for major repairs for the "average" refinery motor was found to be about 7 years. These data are based on 5,200 motors varying in size from fractional to 1,000 hp.

Induction-motor drivers for cooling-tower fans and vertical pumps usually show higher-than-average maintenance costs in refineries, with moist atmosphere being responsible for much of the fan-drive difficulties. Vertical motors driving pumps have bearing failures due to both thrust and radial loads.

It is the general feeling at our plant, said Allison, that the majority

of motor repairs result from mechanical causes rather than electrical.

Mechanical reliability of electric motors in plant service is dependent mostly on these factors:

1. **Lubrication.** Even though it is routine and unglamorous, Allison feels that proper lubrication competes with shaft alignment for first place in mechanical factors affecting motor reliability.

Lack of proper oil-level identification on bearing housings has been a source of much trouble on all types of rotating equipment in refineries. Constant-level oilers are used exclusively at Baytown.

2. **Alignment.** Misalignment affects the bearings of both driver and driven equipment; therefore, driven-equipment alignment practices affect motor reliability. J. C. Arnold, El Paso Natural Gas Products Co., said that his company uses dial indicators for checking runout and angularity when aligning 3,600-r.p.m. equipment. Pumps are set first as level as possible, piping is tied in, and then the motor is aligned to the pump.

Alignment for motors over 200 hp. is accomplished by making a "cold setting" and then a "hot check" to determine if the amount of heat growth was properly compensated for in the "cold setting." If not, the motor-pump set is realigned to compensate for this difference. If a machine were used to pump high-temperature product, it would be necessary for the cold setting to compensate for the greater movement; however, in this case, it is always desirable to confirm the estimate by means of a hot check.

Vibration readings higher than 1 mil can be attributed to poor alignment, bad foundation grouting, or bad bearings, said Arnold. There are some differences in opinions as to what the vibration tolerances should be for various machines. Most manufacturers are unwilling to specify field standards because of the many variations in foundation and alignment specifications, he said. Arnold also noted that El Paso has found only three kinds of excessive vibration trip switches acceptable: The electronic recorder with auxiliary relays, the Vibraswitch, and the inertia switch.

3. **Bearings.** Standard practice for many years at Humble's Baytown refinery has been to use sleeve bearings for motor speeds of 3,600 r.p.m. and in sizes 75 hp. and larger—while using grease-lubricated ball bearings for 60 hp. and below, said Allison. For 1,800 r.p.m., Humble uses sleeve bearings in 250-hp. and larger motors.

On horizontal motors driving pumps, the radial and thrust loads are small; therefore, the rating life of these bearings, frequently as much as 15 years, is usually quite adequate. However, with vertical motors driving pumps, a very different situation exists, explained Allison. The motor thrust bearing must carry the pump thrust, which sometimes varies from what the pump manufacturer calculates. This is especially true on multistage pumps where tests have shown considerable variance from thrust loads expected. Also, on new equipment, the mechanical seal may cause thrust which sometimes has been overlooked by the pump manufacturer. In view of this, said Allison, it is important to require conservatively designed thrust bearings.

4. **Safety and protective devices.** There are a number of safety devices available to prevent damage to motors, such as vibration trips, overload relays, etc. In general, the wise approach is to choose a device that is as reliable as the motor. Lacking this, Allson offered the choice of depending on operators to recognize symptoms of failure and shut down the equipment or setting up a preventive-maintenance program for checking and repairing the safety devices at regular intervals. A close check of overload relays at Baytown over the past 3 years has shown that one out of four is inoperative.

Field Service

Electric motors used in oil-field-production service are usually drip-proof, squirrel-cage, induction type. This motor is as simple mechanically as a rotating machine can be. Consequently mechanical design does not involve any unusual problems, reported M. H. Halderson, Phillips Petroleum Co. The frame and shaft should be sufficiently strong and rigid and the bearings should have sufficient capacity to handle the mechanical loads that will be encountered in service. In addition to good design, Halderson suggests that other mechanical factors important in obtaining dependable and economic operation of a motor are:

1. **Design of belt drives.** A properly designed belt drive avoids use of sheaves that are too small in pitch diameter or that are too wide. Designing drives so that belt speed is above 3,000 ft. per minute will usually result in sheaves that are large enough in diameter and not too wide. Keeping belt speed around 4,000 to 5,000 ft. per minute reduces belt pull required to transmit a given horsepower load and therefore reduces the radial loading on the motor bearings.

2. **Motor installation.** Surface of the rails on which the motor is mounted should be in the same plane so that bolting down the motor does not stress and distort the frame. Sheaves installed on motor shafts should be mounted so that they are as close as possible to the frame of the motor. This results in the minimum radial loading on the bearings. The driver and driven sheaves should be properly aligned. Finally, the motor should be moved back to provide proper tension in the V-belts.

Setting belt tension is one of the most difficult and one of the most important parts of providing a proper installation. There is a practical procedure in the API Belting Standard for setting belt tension by measurement. Measuring tension in all drives may not be justified but it is worth while on higher-horsepower applications such as drives on water-injection pumps, mud pumps, and the larger reciprocating compressors.

3. **Lubrication.** A good lubrication program for motors used in production service begins with using a high-quality ball-bearing grease, with another requirement being a regular schedule for using the grease. Phillips has established a lubrication frequency for electric motors as follows: Once every 3 years for motors of 7½ hp., 1,200 r.p.m.; once every 2 years for 10 to 25-hp. motors; once every year for 30 to 100-hp.; and once every 6 months for 125-hp. and larger. This program has been working satisfactorily for more than 3 years, and indications are that some of the lubrication intervals can be extended.

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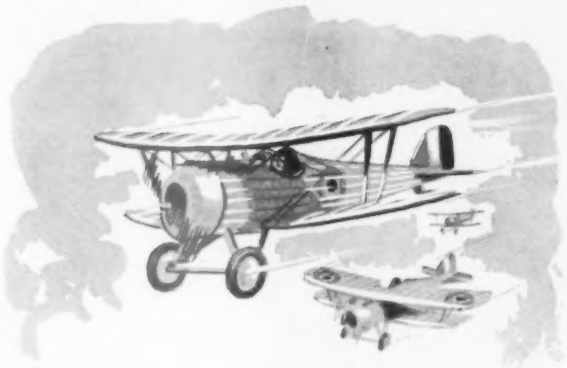
BY H. A. MITCHELL
Shell Chemical Co.
New York



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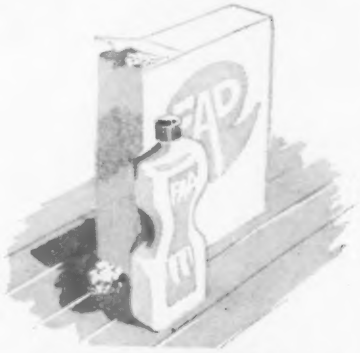
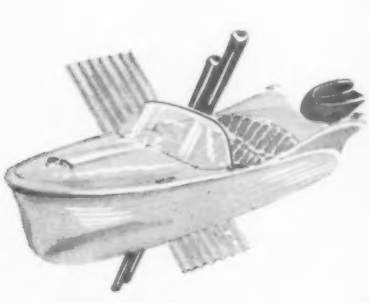
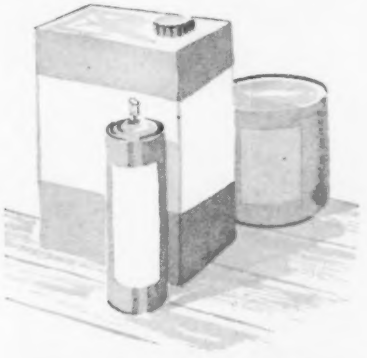


. . . followed by the production of low-molecular-weight polymers that go into detergents



. . . higher alcohols and aldehydes for plasticizers that are used in the plastics industry



. . . and, coming up fast, are the newer uses for polypropylene, acrolein, acryonitrile, and others.

DEVELOPMENT of new petrochemical processes using propylene as a raw material, and the assurance of adequate supplies as a result of recent trends in the petroleum industry, are creating new interest in propylene derivatives.

Future requirements for established propylene chemicals together with the commercial availability of such new propylene derivatives as acrolein and acrylonitrile, justify the increased research in further use of this versatile raw material. This, plus the promise of a breakthrough in polypropylene production, will soon bring the propylene-based chemicals back into the prominence they once had in the petrochemical industry.

Largest demand. Propylene was one of the first petroleum raw materials used in chemical manufacture, and isopropyl alcohol was one of the first chemicals produced by the fledgling petrochemical industry during the last days of World War I. As so often happens, demands of the military provided impetus for the breakthrough. In this case, acetone, produced from isopropyl alcohol, was the critical material for manufacture of aircraft "dopes" for the planes of that era.

Isopropyl alcohol production, in the order of 1 billion pounds annually during recent years, represents the largest direct use of propylene in chemical manufacture.

Historically acetone was produced from isopropyl alcohol, with the exception of the limited quantities from fermentation processes. However, with the advent of phenol production by the cumene hydroperoxide process and its resulting by-product acetone, a new source of acetone has developed which accounted for roughly 15% of 1959's production of 736 million pounds. The only factor common to these processes is that they require propylene as a basic raw material, and as acetone demand continues to grow, propylene consumption will keep pace.

Presented at the 44th National Meeting of the AIChE, New Orleans.

" . . . the major portion of propylene is produced in petroleum-refinery cracking operations as a coproduct of motor gasoline. The remaining, but growing, source is coproduced with ethylene in the cracking or propane or heavier feed stocks."

The second-largest chemical requirement for propylene is in the production of low-molecular-weight polymers. The most important of these, propylene trimer (nonene) and tetramer (dodecene) represent the use of approximately 570 million pounds of propylene in 1959.

The determining factor in propylene tetramer demand is the share that dodecylbenzene sulfonates capture of the total detergents market. It is estimated that 1960 dodecylbenzene production will approximate 500 million pounds. Here we see again the ever-present conflict of the chemical field, with one of the major outlets for propylene trimer, the manufacture of nonylphenol for nonionic surfactant production, competing with dodecylbenzene for the ultimate market. However, even though the anionic detergents' share of the U. S. market may decline percentagewise, the total requirements in this area are expected to show continued growth and thus provide an increasing requirement for propylene.

Other uses. One of the newer processes using propylene, or propylene derivatives, is the "oxo" process. Here propylene, propylene tetramer, propylene trimer, and heptene, produced by copolymerization of propylene and butylene, serve as raw materials for making higher alcohols and aldehydes. The largest share of these oxo-alcohols and aldehydes is used in the manufacture of various plasticizers for the plastics industry. Although there are competing processes, as well as competing materials, for this same market, the outlook for oxo-chemicals and propylene utilization in this area is still good.

Propylene oxide had a 1959 production of roughly 290 million pounds, and its derivative, propylene glycol, went over 150 million pounds. These propylene products have an attractive future because of the promising outlets in polyether urethanes, surface-active agents, polyester resins, and polymers.

Recent developments. A review of the established processes using propylene would not be complete without mentioning synthetic glycerin which now accounts for roughly one-half of the total glycerin production in the U. S. However, even here, where the first commercial production by way of the propylene-allyl chloride route was started in 1948, competing processes are developing. Hydrogen peroxide has now teamed up with acrolein, one of the newest propylene derivatives, for the production of synthetic glycerin. And, curiously perhaps, not only is the final product a factor in the synthetic-resin and surface-coating field, but several of the materials attendant to both processes such as epichlorohydrin, allyl alcohol, and acrolein, are expected to develop a place for themselves in the same fields.

Future. One of the most promising, and at the same time most competitive, outlooks for increased propylene utilization lies in the broad field of polyolefins. Increased interest in polypropylene and the potentials of propylene copolymers with other olefins in the elastomer field promise a rapidly growing requirement for propylene. Many companies have already announced their plans in polyolefin production, and the future is good.

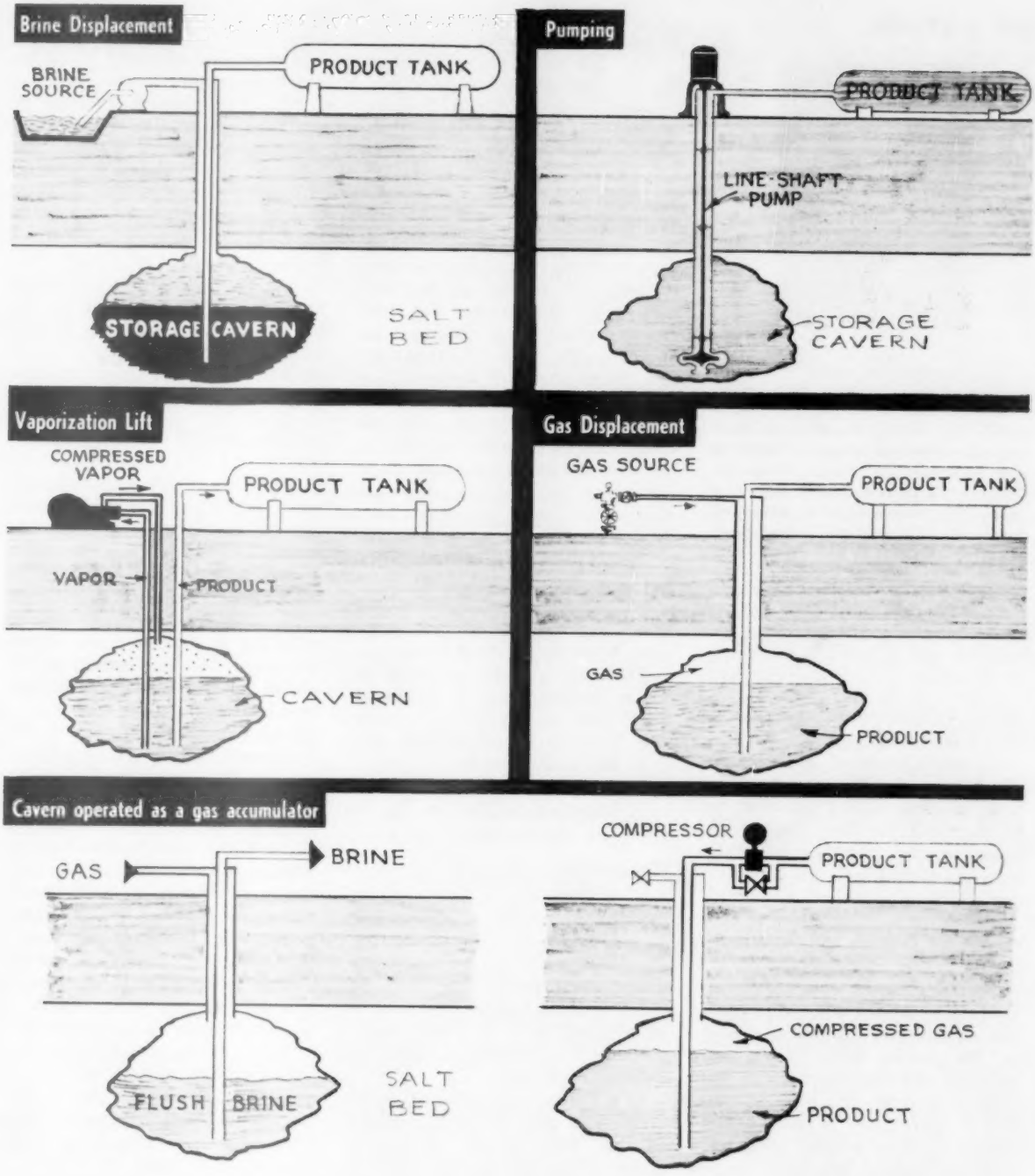
The production of acrolein directly from propylene represents the commercialization of extensive research work dating back over several years. The assured availability of this chemical in substantial volume has stimulated research on promising derivatives such as glutaraldehyde, glycidaldehyde, glyceraldehyde, and 1,2,6 hexantriol, to name but a few, and will create a place for this versatile propylene derivative in the chemical industry.

Another example of renewed interest is the recent commercialization of a process for producing acrylonitrile from propylene and ammonia. This new process not only offers an alternate to the established acetylene-hydrogen cyanide route for this chemical, but will no doubt lead to future study of this additional reaction process involving propylene.

The long-range growth pattern for major propylene derivatives and the outlook for those products which have been developed in the last few years are expected to return the derivatives of propylene to the commanding position which they once enjoyed in the petrochemical industry.

Propylene availability. Although there are, no doubt, few who do not already realize it, the major portion of propylene is produced in petroleum-refinery cracking operations as a coproduct of motor gasoline. The remaining, but growing, source is coproduced with ethylene in the cracking of propane or heavier feed stocks.

Total propylene potential from these sources is estimated to be in the range of 20 billion pounds per year with the petroleum refineries accounting for roughly 90% of this quantity. Inasmuch as only 2.1 billion pounds were reported to the U. S. Tariff Commission in 1959 as utilized in chemical production, it is apparent that a large reserve is available. Almost all of this remainder, perhaps 85% of the total, is used in various refinery processes for producing motor and aviation-gasoline components. However, when processes have been developed and the demand for propylene in petrochemical manufacture increases, the supply is at hand.



5 ways to recover stored LPG

from salt caverns without enlarging the cavern

BY C. T. BRANDT
Consultant, Bartlesville, Okla.

THIRTEEN YEARS AGO, the possibility of storing a high-vapor-pressure petroleum product in an underground salt cavern was only a subject of thoughtful discussion. A recent survey (OGJ, Nov. 28, '60) shows that there is now more than 50,000,000 bbl. of LPG storage capacity either completed or

THE AUTHOR

C. T. Brandt is an underground storage and mining consultant with offices in Bartlesville, Okla. He received a degree in mining engineering from Colorado School of Mines in 1943. He was employed by Phillips Petroleum Co. in 1952 as a technical consultant specializing in mined and dissolved underground LPG storage. Since entering private consulting practice in 1960, he has been actively engaged in developing several underground-storage projects including those along the recently completed Mid-America pipeline.

under development in caverns dissolved from salt.

As development of underground salt storage of LPG has progressed from an idea, to an experiment, to an accepted standard method of operation, the emphasis on problems has shifted from the construction phase to operations. Currently, the most pressing problem is how to recover product without enlarging the cavern excessively.

Several different ways of removing product from a salt cavern without affecting its size are discussed in this article. Some of the advantages and disadvantages of the various methods are brought out, and the conclusion is reached that selection of the method ultimately used will depend to a large extent on existing conditions.

Early operators in the underground-storage field were quick to find that product stored in caverns dissolved from salt could be recovered simply and cheaply by displacement with fresh water. With this recovery method, nearly all the facilities used to develop a cavern could also be used to operate it. Since no major additional investment was required, this method of operation became more or less standard and has been used in a majority of the installations.

But, this particular method of product removal has one drawback, however. Each barrel of fresh water injected into the cavern to displace product will dissolve some additional salt. Theoretically, each 6.03 bbl. of fresh water injected into the cavern will create 1 additional barrel of storage space. In actual practice, however, each time a cavern is completely emptied by displacement with fresh water, the total cavern capacity only increases by approximately 11%. At this rate, the cavern size will double in 7 turnovers and triple in less than 11.

Common sense dictates that no cavern can be enlarged indefinitely. So, with the passage of time, more and more operators of dissolved caverns are reaching the point where they can no longer run the risk of continued cavern enlargement. They feel that they must convert to a nonenlarging method of product removal. There is some question, however, as to what method to use.

There are a variety of ways by which product may be recovered which have no influence on cavern size. The best known methods are:

1. Brine displacement.
2. Pumping.
3. Vaporization lift.
4. Gas displacement.

Brine displacement. If the brine used is saturated, or nearly so, its use will not result in appreciable cavern enlargement. However, for an operation of this type, one needs a source of brine. This may be either a brine storage reservoir, a brine-source well or, if one is particularly fortunate, a naturally existing brine well.

If a storage unit is located in an area where there is also a naturally existing brine source, then it is simple to tap this source, install a pump, and have a simple and efficient method of product displacement.

Quite often it has been found necessary to develop additional storage cavities in the same area as the operating cavern. In this case, brine can be obtained from the development well for product displacement. Usually brine from the development well can be used for approximately 8 turnovers in the operating storage before the new cavern is equal in size to the operating storage.

If there are alternate injections and withdrawals in the operating storage, and volumes handled at any time are nominal rather than full cavern capacity, life of the brine-source well can be lengthened considerably by providing brine-storage capacity approximately equal to the normal volume of product handled. Under these conditions, the brine-source well would be used only to make brine for displacing product over the normal volume or to empty the cavern during periods of high seasonal demand.

Brine storage and disposal. Excess brine produced on product injection must be disposed of in some manner. If a good means of getting rid of salt water at the required rates is available no problem exists. If, however, the salt water must be disposed of in a well that will take water only in a slow rate at high pressure, or into an open stream where the rate and amount of discharge depends on stream salinity, then cavern operations may be considerably hampered.

One solution to this problem is the use of intermediate brine storage in which salt water may be accumulated at high rates and discharged either at a slow rate or when conditions permit. In most instances, storage of intermediate size may suffice but, in some cases, it may be necessary to have a reservoir equal in capacity to the storage unit. This is particularly true in the case where discharge rates are controlled by stream flow.

If conditions are such that bulk brine storage is required it can probably be provided most economically in open reservoirs. However, because of stringent pollution regulations in most states, storage in unlined earthen reservoirs is not generally found to be acceptable. But brine storage, in reservoirs ranging in size up to 3,500,000 bbl., is being provided in state-approved, asphalt-lined ponds. Prefabricated asphalt linings can be installed in these pits for about 30 to 35 cents per square foot.

Assuming that conditions are right, there are other ways that may be used, either to develop brine storage space, or to utilize space

developed through brine-source wells for working brine storage.

One installation in West Texas now has some 3,400,000 bbl. of storage capacity developed in 11 storage wells in a salt bed lying between 1,200 and 1,580 ft. below the surface. In this particular area, there is also a shallow salt bed 190 ft. thick beginning at a depth of 440 ft. below the surface. That company is now developing a brine storage cavern in the shallow salt layer equal to the capacity of the 11 storage wells.

As the initial step on this project, two wells were sunk through the shallow salt and interconnected by fracturing. Circulation was established between the wells and they are now producing brine for use in product displacement. As the cavern created in this operation approaches what is thought to be a safe maximum size, additional wells will be sunk and connected to it by fracturing. This process will be repeated until a capacity in excess of the present storage capacity is reached. At that time, some of the brine-source wells will be equipped with line-shaft centrifugal pumps and the cavern used for brine storage.

Up to the point where installation of pumps is essential, this method can be used quite successfully in conjunction with most installations developed in layered salt beds. The method is not particularly adaptable to salt domes, however, because the general homogenity of salt in domes, and consequent lack of horizontal zones of weakness, precludes controlled fracturing and subsequent connection of the holes.

In salt domes, however, considerably larger caverns can be developed than is possible in bedded salt deposits. The largest brine cavern that I know of has a capacity of some 12 million barrels and there are several that approach 10 million barrels in size. Thus, an individual brine-source well would have a considerably longer life than a similar well completed in a bedded salt deposit. Also, it could be developed for between $100,000 and $150,000, and would have a relatively low operating cost.

Economic analysis will generally show that some form of operation by brine displacement will present the greatest economic advantages to the operator. However, the method is not without its problems and there are situations where, due to ground conditions, space limitations, economics, or state regulations, it is not necessarily a feasible mode of operation.

Product removal by pumping. It is possible to install a line-shaft centrifugal pump in a salt storage cavern for product removal, and at less than the cost of a brine-source well or a brine storage pond. Also, if a pump is used, it will eliminate the need for brine-source wells, brine disposal, or brine storage as the case may be. However, the pump has some severe disadvantages:

1. The amount of product that can be handled by a line-shaft centrifugal pump decreases rapidly with depth. In caverns at depths of less than 1,000 ft., discharge rates as high as 1,500 g.p.m. are practical. If the depth is increased to 1,500 ft. however, the rate would fall to approximately 200 g.p.m. And, beyond the depth of 3,000 ft., the line-shaft centrifugal pump loses all practicality.

2. The high-vapor-pressure products generally stored in dissolved caverns are notoriously poor lubricants. They will eventually penetrate the pump lubricant seals and cause excessive bearing wear. Consequently, high maintenance costs can be expected. Where pumps are used, it is usually necessary to provide duplicate facilities to prevent complete shutdown due to pump failure.

3. The pump includes downhole equipment which is extremely vulnerable to the ever-present hazard of rock falls.

4. Removal of product by pumps will result in nearly total evacuation of the cavern. With no liquids in the cavern, the pressures exerted on the walls of the cavern will be materially reduced. This could seriously affect the resultant of the ground forces at work and may cause a shift in the balance of stability. Thus, a maximum-size stable cavern in the liquid-full state may become a structurally unsound hole in the evacuated state.

Danger of damage to the pump due to rock falls may be circumvented by locating the pump in a cased hole adjacent to the storage cavern. This hole could be connected to the cavern either by washing through or by a combination of fracturing and washing. Construction of this extra hole will add materially to the cost of a product-removal installation using a pump.

The reduced-pumping rate problem can be overcome by use of a downhole submergible pump. But this type of pump has also experienced trouble due to lubrication problems and can be expected to have a high maintenance cost.

While the submergible pump eliminates some of the disadvantages of the line-shaft centrifugal pump, it also introduces an additional problem. The motor and protector of a submergible pump is some 30 ft. long. For cooling, the intake is located above the motor and protector unit. Additionally, the pump requires a net positive suction head of 15 ft. Thus, the total submergence of the bottom of this pump must be at least 45 ft. If this submergence is provided in the cavern, then the storage capacity in the lower 45 ft. of the cavern is lost for all practical purposes.

If a means of providing a rat hole in the cavern could be developed, then this difficulty could be overcome. To date, however, no method has been developed to protect a predrilled rat hole from being filled with insoluble material during washing. Further, no practical means has been developed to create a 45-ft. rat hole in the unconsolidated insoluble materials left in the bottom of the cavern on completion of washing.

As in the case of the line-shaft centrifugal pump, the submergible pump would be extremely vulnerable to rock falls within the cavern. The problem of rat holing and protection from falling rock can be handled by installing the submergible pump in a cased hole adjacent to the developed cavern as explained previously.

Other pumps are available for service in connection with these underground LP-gas caverns but, in most instances, they introduce more problems than they solve. The downhole barrel pump with the surface pumpjack is adaptable only to low rates and would have some severe lubricating problems. The

same comments apply to the use of a hydraulic bottom-hole pump.

Lubrication problems may possibly be overcome by the use of the recently developed sonic pump. This pump operates by means of an oscillator unit attached to the top of the pump column and a series of check valves at each tubing joint. Harmonic vibrations operating in conjunction with the check valve provide the lifting force to move product out of the cavern. To date, this type of pump has been developed only for low rates and is unproven for operation in light-hydrocarbon service.

With the exception of lubricating problems, comments on the use of pumps will apply regardless of whether the pump is used in the hydrocarbon storage cavern or in the brine storage cavern.

Product removal by vaporization lift. In this method, hydrocarbon vapors are withdrawn from a relatively small-diameter tube that extends to the bottom of the storage chamber. These vapors are recompressed and injected into the vapor space above the liquid in the cavern. Bubbles caused by the vaporization of liquid hydrocarbon under reduced pressure within the tube create, in effect, a gas lift which will carry product out of the hole.

This method eliminates the need for downhole pumping equipment; overcomes the necessity for an additional hole for pump protection; and further, it, at least partially, preserves the cavern pressure. However, it has a relatively high operating cost, is applicable only to propane and higher-vapor-pressure products, and is limited in depth of operation to 1,400 ft. maximum. It is also limited in the rate of flow to be expected. These disadvantages preclude its general use as a means of product removal in caverns dissolved from salt.

Product removal by gas displacement. In gas displacement, gas is injected at pressures high enough to force the stored product out of the cavern through a tubing string that extends to the bottom of the cavity. This method does not involve additional equipment and extra pump holes either, and it is adaptable to any product at any depth and any rate. It also preserves to a large extent the pressure within a cavern.

This system will require a gas source capable of both giving and taking large quantities of gas at irregular intervals. In all probability, compressors would be required in handling the gas and operating costs would be high. Further, the stored product may be contaminated by dissolved gases and there may be some product loss in the displaced gas.

If the storage is in connection with plant operations, it may be possible to use waste gases for product removal with the gases subsequently being flared on removal. Such an operation would require compression equipment and a large volume of gas available on demand at any given time. Again, there would be the problem of contamination and loss of product.

Product displacement with the cavern operated as a gas accumulator. A variation of the gas-displacement principle involves using the cavern as a gas accumulator. In this method, the cavern would be emptied of its initial brine by gas injection. The gas would then be shut in, product would subsequently be forced into the cavern and the gas compressed. Pressure from the compressed gas would be used to discharge product when required.

This method is adaptable to both high and low flow rates at various depths and requires no downhole equipment. It requires a high initial investment because of the initial gas cost and the cost of compressor equipment necessary to inject the product into the cavern. Further, this type of operation requires a cavern with a total volume much larger than the volume of product to be stored, and also has the disadvantage of possibly producing gas contaminated product.

The accumulator scheme is probably most adaptable to use with large brine-storage caverns developed in salt domes where advantage can be taken of the high specific gravity of the brine and in the depth of the salt. Product contamination will be avoided since the gas will not come directly in contact with the product.

These then are a variety of ways by which product may be removed from a storage cavern dissolved from salt without increasing the size of the cavern. All of the methods have their advantages as well as their drawbacks and no one method can be said to be the best method for product removal in every instance. All LP-gas storage installations are subject to particular limitations because conditions vary from site to site. Therefore, each facility must be analyzed individually to find which method provides the most advantageous and economical means for removing product without increasing the cavern size.

BOOKS

DECISIONS UNDER UNCERTAINTY, DRILLING DECISIONS BY OIL AND GAS OPERATORS. By C. Jackson Grayson, Jr. Published by Division of Research, Harvard Business School, Soldier's Field, Boston, 63. 402 pp. $6.

This is an unusual book about decision making by business executives with particular emphasis on the uncertainty aspect. It describes how certain men make investment decisions under conditions of great uncertainty, prescribes techniques that may help them make more rational decisions, and suggests possibilities for teaching these techniques to them.

In general, the book is concerned with capital budgeting and decision theory. Specifically, it centers around a singular uncertainty decision—the decision by oil and gas operators to drill, or not to drill, a well.

The volume explains that an operator uses two general processes to reach decisions. He looks at the venture as a whole, considering the many factors, and decides largely on the basis of judgment and experience. Or he may formalize the facts and assumptions, explicitly relate them in an analytic form, and make his decisions according to specified criteria such as payout, discounted rate of return, or profit-risk ratio.

The second part of the book attempts to apply some of the new decision-theory principles—formal, analytical thought processes—to assist operators in making these difficult decisions under uncertainty.

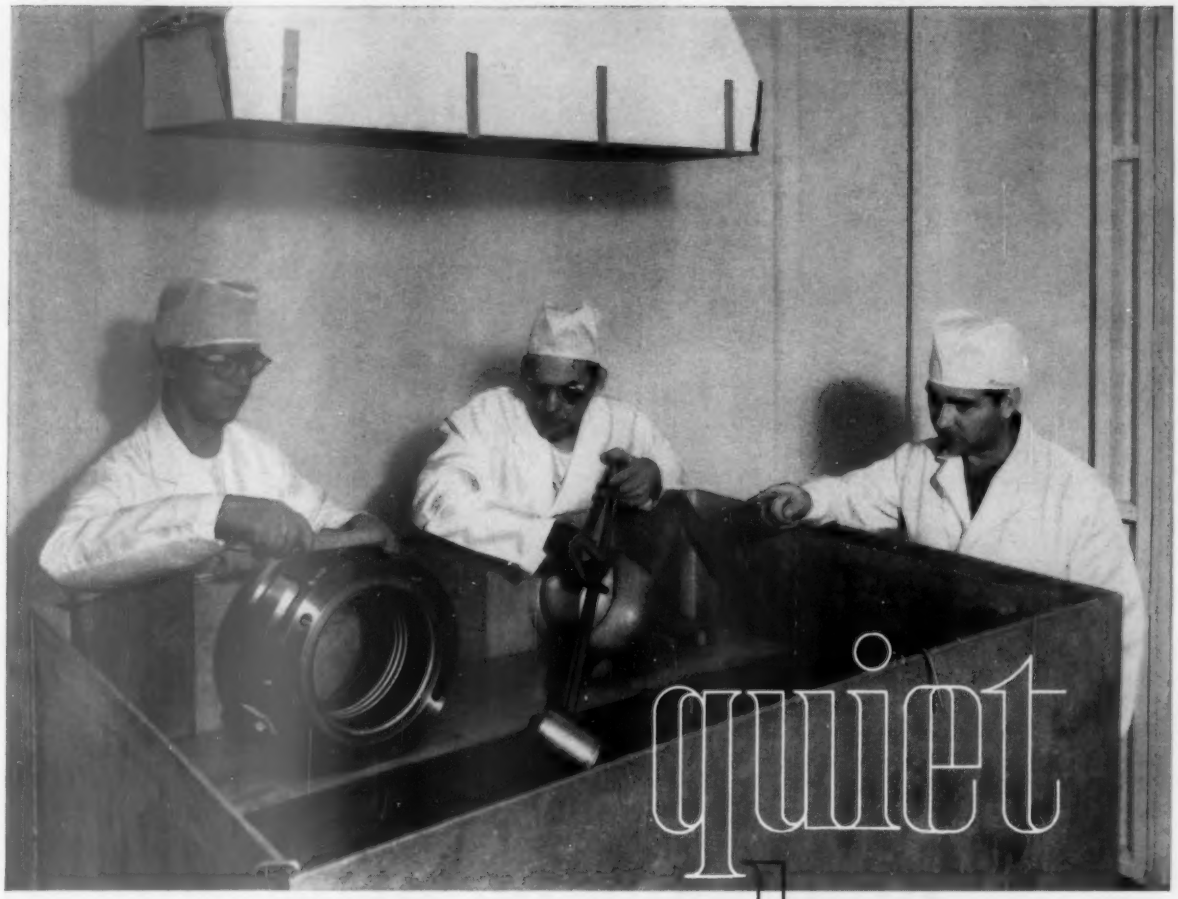
RESEARCH STUDY OF SHUT-IN GAS WELLS, TEXAS RAILROAD COMMISSION DISTRICTS 1, 2, 3, and 4. Published by Austin Oil & Gas Publishing Co., Box 5146, West Austin Station, Austin, Tex. Price $80.

Data for this report were compiled and prepared from the records of the Texas Railroad Commission and edited by Robert E. Parris. It is a listing of every shut-in gas well in South Texas and the Gulf Coast of Texas; approximately 2,000 wells are included. They lie in 66 counties, and data are as of May 31, 1960.

The listings are arranged alphabetically by Railroad Commission districts; each district is then arranged by counties, fields, operators, leases, and well numbers. The tabulation includes survey location, date of completion, perforated interval, pressures, gas gravities, and potential tests.

This book is a must for anyone who is interested in the subject of available unconnected gas reserves.

Note: The Oil and Gas Journal maintains a book department. Write to the READER SERVICE DEPARTMENT, P. O. Box 1260, Tulsa 1, for copies of the book list. Often books reviewed here may be purchased from this source.



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RUNNING ONE OF THE TWO EXTERNAL BEADS with automatic submerged arc welding on rotated pipe with a Crose-Price-O-Matic unit.

Automatic pipeline welding

Here's why, and a look at the possibilities of several

By ROBERT S. RYAN
Supervisory Engineer,
Columbia Gas System Service Corp.
Columbus, Ohio

THERE IS an ever-increasing impetus to automate the welding operation in pipeline construction. Many advances have been made in the manual and automatic welding procedures for pipeline construction. Great numbers of welders and welding engineers have made outstanding contributions to the present state of the art. While these procedures have been quite adequate, other trends necessitate new developments and techniques.

An important factor in the need for automatic welding is the trend towards higher-strength steels for pipe. The pipeline industry is now on the threshold of another horizon where still-higher-strength steels now appear to be feasible. The most recent development in higher-strength materials is a mild carbon steel with a minimum yield strength of 56,000 psi.

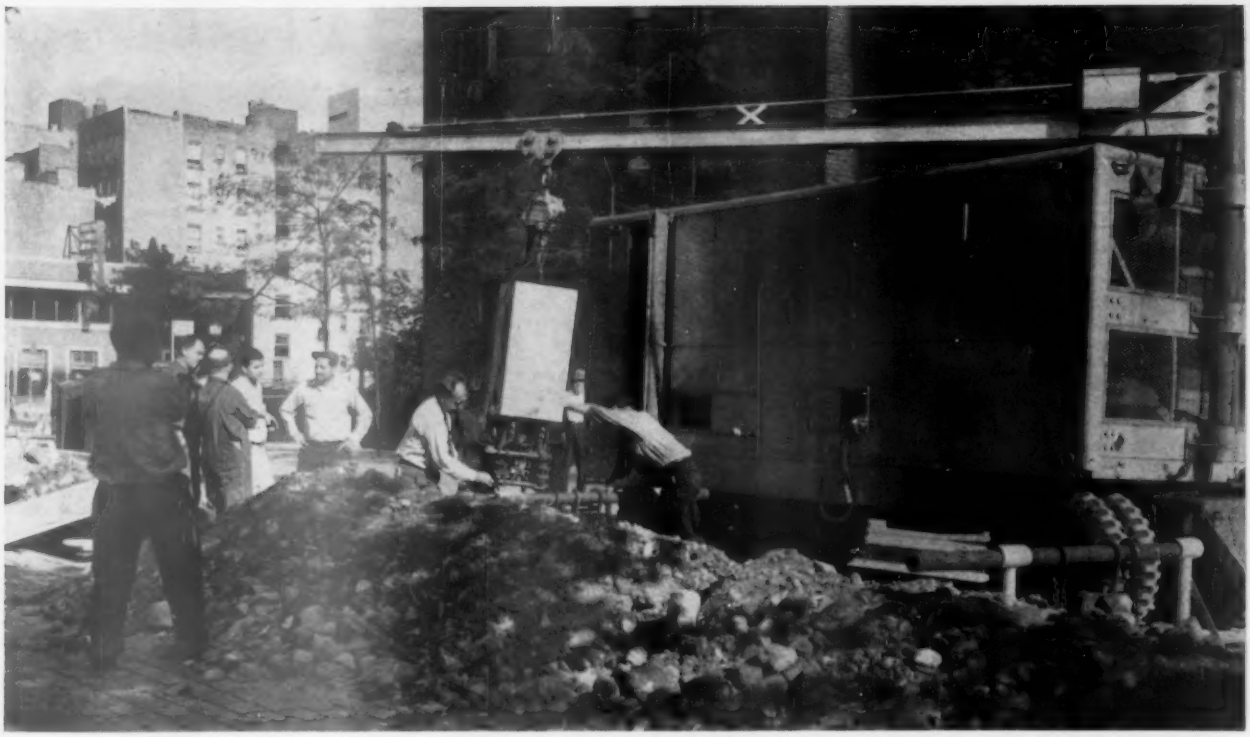
Some pipe manufacturers have already experimentally produced 60,000 and 70,000-psi.-yield-strengh materials. The purpose of mentioning these higher-strength steels is to indicate the necessity for development of automatic welding equipment because the maximum physical properties of the present manual arc-welding electrodes have been reached.

The purpose of this article is to present some of the outstanding aspects of the welding procedures being used in the construction of large-diameter pipelines today.

Pipeline Materials

The majority of all pipe steels are in the classification of mild carbon steels. Recently there has been increased interest and activity in the development of higher-strength materials. There was considerable difficulty encountered in the use of the early API 5LX grades of pipe. This difficulty was most pronounced in the API 5LX 52 grade of pipe and appeared in the form of underbead cracking. An extensive research program, plus the intense effort of pipeline welders and welding engineers, has resulted in the development of procedures which eliminate the incidence of underbead cracking.

Pipe manufacturers are experimenting with higher-strength steels for pipe. Yield strengths on the order of 70,000 to 90,000 psi. are contemplated. While the particular



POWER SUPPLY in 7½-ton trailer and equipment for induction welding of electrical conduit lines of Consolidated Edison Co. Pipe is in fixed position.

is fast becoming a "must"

new types now in actual use or development stages

metallurgical characteristics of these steels have not been established, it is fairly evident that the weldability of these steels will be somewhat different from the present grades.

A pipeline is merely a pile of pipe until the pieces are joined together. The present manual arc-welding procedure for joining these pieces together is the "downhill" welding procedure. In the wall thickness common to the pipeline industry, downhill welding utilizes higher welding currents which results in faster welding speeds.

It is intriguing to see how proficient a good pipeline welder can become in obtaining a weld on the inside of the pipe, while welding from the outside. In contrast to the downhill welding procedure, the uphill welding procedure is used for pipe welding on power piping and extensively in fabricating shops.

An important part of the welding procedure is the weld cleaning. Each pass must be cleaned thoroughly before the next pass is deposited. A great deal of the weld quality depends on the thoroughness of cleaning between passes. Many times inferior welds have been caused by improper cleaning. While the strength of the weld joint does not require that the slag be removed from the cover pass, it is still removed for weld inspection.

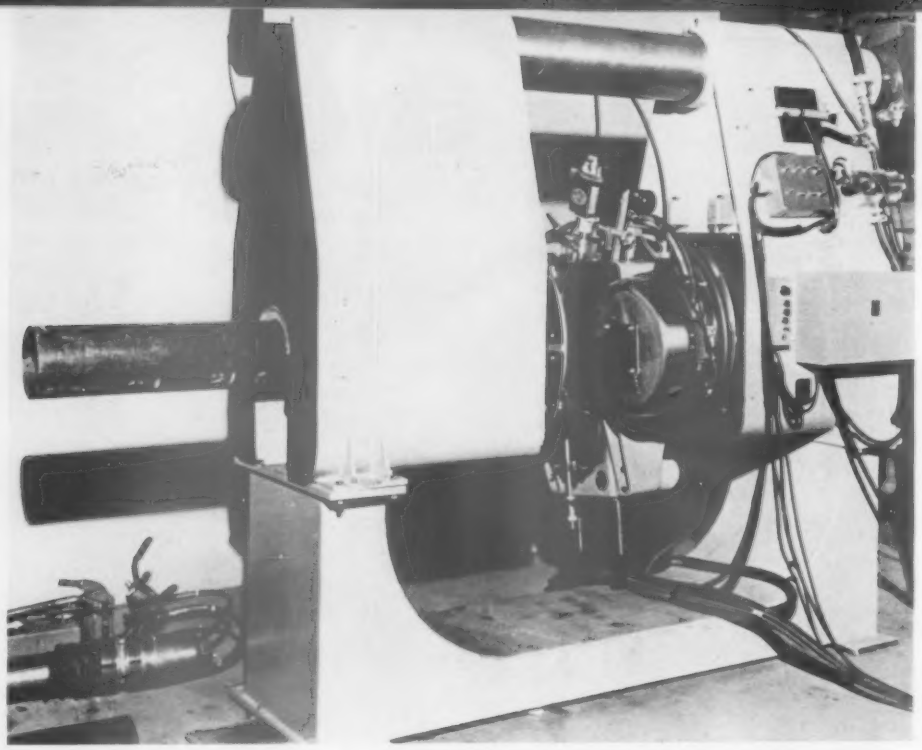
Most pipeline companies use X-ray for the nondestructive testing of the circumferential pipeline welds. We feel that this nondestructive inspection has done more to improve the quality of welding on pipelines than any other single factor.

Automatic Arc-Welding Equipment

The development of automatic welding equipment to be used in the construction of pipelines has been slow for a number of reasons. The present manual arc-welding procedure for crosscountry welding of large diameter pipelines is quite flexible and the speed is phenomenal. In any automatic welding process, it is difficult to complete with the speed and flexibility of the manual arc welding procedure.

In addition to this, the tolerances on pipe are so loose that it requires the manual skill of a welder to adjust for the numerous conditions that are encountered to get complete penetration around the entire circumference of the weld joint. For this reason, it is not contemplated that there will be a sudden drop in the need for the welding skill and technique which is quite apparent in many pipeline welders.

The need for the dexterity of the



MACHINE FOR WELDING PIPE in a fixed position by the CO_2 shielded arc process, developed by Esso Research & Engineering Co., in cooperation with Battelle Memorial Institute and Air Reduction Sales Co.

welder is very apparent by those who have tried to automate this operation. The problem with many automatic welding processes tried so far on pipeline welding has been the inability of the automatic equipment to adjust to the irritating number of variables that are encountered. These irritating variables can be taken in stride by the pipeline welder.

New equipment. There are two relatively new pieces of equipment for automatic submerged arc welding which are being used for double jointing. In this equipment, it is necessary to rotate the pipe in order to make the weld.

In the Crose-Price-O-Matic equipment, the two lengths of pipe are positioned on the pipe racks, and then onto the rollers. The pipe ends are butted together with a small gap at the bottom of the pipe. When the lineup is completed, the welding head is moved into position. The turning rolls rotate the pipe while the automatic welding head makes two complete passes on the outside of the pipe.

When these two external passes are completed, the lineup clamp is removed. An automatic welding head has been developed to go on the inside of the pipe. A single pass is then deposited on the inside of the pipe by this equipment.

The Bechtel-Perrault automatic welding equipment is another adaptation of the double-jointing process which also utilizes the submerged arc-welding process. The lineup clamp is a modified pneumatic clamp which presses expandable, full-circumference, segmented backup shoes against the underside of the weld joint. This backup ring is covered with a glass-fiber sleeve which is held firmly against the weld joint.

The glass sleeve conforms so closely to the joint contour that the molten metal is confined to the welding seam producing a smooth, low root bead for wall thicknesses on the order of ⅜-in. and which are normal to pipelines. The operator starts the pipe rotating at a preset speed and the welding head deposits the first pass. Two passes, deposited from the outside of the pipe, are normally used in this range of wall thicknesses. Three passes are used for thicker pipe.

Equipment control. One of the important advantages of these automatic processes is the ease and extent with which the equipment can be controlled. In spite of the inherent lack of process flexibility, as compared to manual arc welding, the submerged arc-welding process can continually produce circumferential welds of consistently good quality. The particular significance of this feature is that these consistently good welds are made on weld joints of wide variations in dimensions, e.g., circumference, diameter, wall thickness, etc.

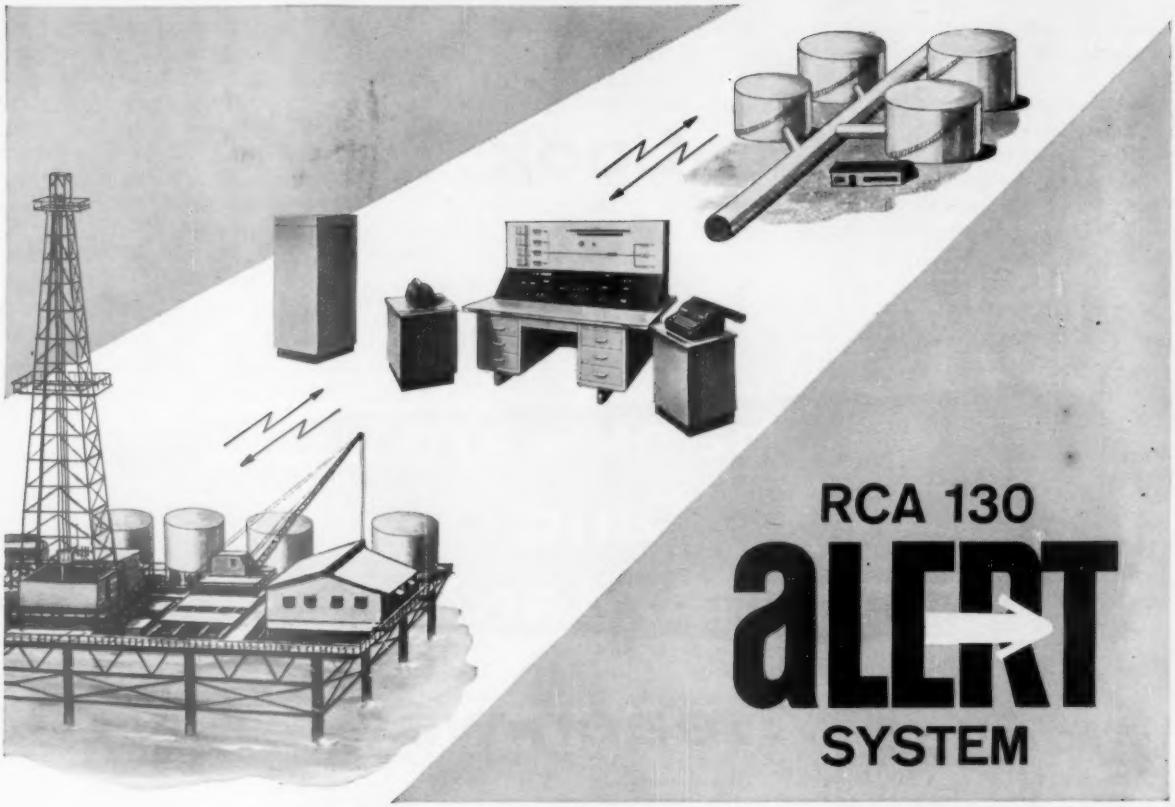
Physical properties of a weld deposit made by the automatic processes make it much less susceptible to underbead cracking than the deposits made manually. Therefore, we have come to expect fewer difficulties with welds made by an automatic welding process, as opposed to manual welds.

Further Development

There is some equipment that represents a major breakthrough in automating the welding operation. This development has been accomplished by the joint efforts of Battelle Memorial Institute, Esso Research & Engineering, and Airco. This equipment has been developed to weld the pipe out on the pipeline right-of-way, joining length after length of pipe.

A different concept is used here from any other manual or automatic welding procedure. The unique feature is that the complete weld is accomplished in a single pass with the consumable electrode shielded by CO_2. Approximately one mile of 6-in. by 0.219-in. wall X-46 pipe was recently welded with equipment of the type shown in illustration. Additional equipment is being built for 16-in.-diameter pipe.

The primary difficulty with this



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unit, and incidentally a major problem in the development of all automatic welding equipment, is that it is necessary to have very precise fitup. Part of this has been accomplished by the use of very exact spacing of the ends of the pipe. A further refinement in the spacing is made by an abrasive cutting disk which cuts the spacing between the ends of the pipe to less than 1/16 in.

The resultant spacing between the joints is narrow enough to obtain a good weld without backup and wide enough to permit welding with a very short arc. The Airco equipment is a tremendous advance in automatic equipment. With some minor modification in present construction procedures and practices, there is great potential for this unit.

Other units. There are other units being developed that also appear to have some potential. Some of these are incorporating such welding processes as tungsten-inert-gas, electric-resistance, and vapor-shield. At any rate, some automatic units are on the way to improve the present welding procedures for pipeline construction.

Consolidated Edison Co. of New York has adapted the induction welding process into automatic equipment, for joining small-diameter pipe. This welding process utilizes a high-frequency induction current to produce sufficient heat to make a butt weld in little over 1 minute. The pipe ends are swaged to a larger diameter to assure good end tolerances in the pipe and to eliminate the possibility of having an internal upset in the pipe.

In the welding operations, the pipe ends are brought together in the equipment and adjusted so that the largest possible area of abutting surfaces is in contact. The coil is placed around the joint and the joint is shielded with an inert gas from the inside and outside. A hydraulic cylinder is used to push the joints together with a pressure at the joint of approximately 2,000 psi.

Although the actual welding operation takes only about 1 minute, the loading of the pipe in the fixture and the alignment on 8-in. pipe, for example, would take about 10 minutes.

The diesel-driven generator for the high-frequency current and the control unit, containing meters, timers, capacitors, and protective devices, all are transported in a 7½-ton trailer.

This equipment has been used in the construction of a number of pipelines used for electrical conduit in and around New York City. In service as a conduit for pipe-type cable, it operates continuously at pressures in excess of 200 psig. and at temperatures up to 140° F. One of the difficulties in the use of this equipment is that there presently is no good production tool for nondestructively testing this finished joint.

Battelle Memorial Institute has recently concluded a project in the development of induction-welding equipment for small-diameter pipe. It has also obtained success equal to that demonstrated by Consolidated Edison. Of course, the major problem in any induction-welding process is to develop sufficient heat and pressure to obtain complete fusion.

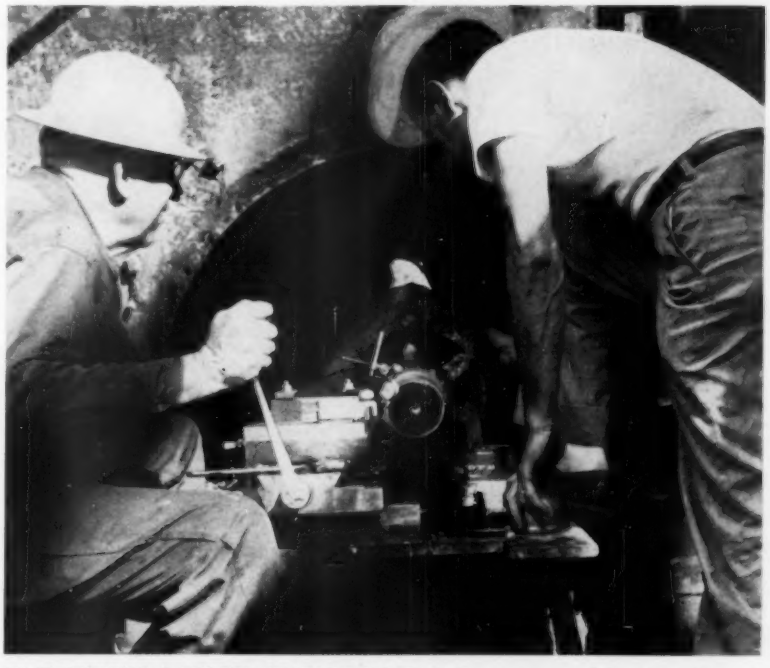
Fan shaft machined in place

HERE WAS the situation faced by American Oil Co.'s Texas City, Tex., refinery. The outboard babbitt bearing on a boiler induced-draft fan was wearing rapidly because of a scored journal shaft. Machining the scored shaft would have presented no problems, but it was 12 ft. long and attached tightly to the fan's impeller. Further, all shop lathes were too small.

It was decided to machine the shaft in place. Machinists set a 1-in.-thick steel plate below the shaft for a "work bench." On the work bench a 24-in. engine-lathe steady rest was mounted. It supported the shaft and permitted exact alignment which prevented a taper or eccentric cut. A feed table with a crosscut feed was mounted on the work bench, also.

Now, all was in readiness for machining. The shaft was rotated by operating the fan's steam turbine driver at about 40 r.p.m. New babbitt was poured for the bearing and the bearing was machined to fit the smaller shaft.

The boiler was on the line after only a few days' down time instead of weeks by conventional methods, thanks to the maintenance crew's combined know-how.



BY MACHINING A SCORED SHAFT IN PLACE, boiler was out of business for only a few days instead of weeks had maintenance men followed conventional practice.

Prime movers: Internal-combustion engines

BY JOSEPH ZABA

THERE ARE several ways to classify piston-type internal combustion engines: (1) type of fuel, liquid or gas, (2) thermodynamics of cycle, Otto, diesel or mixed, (3) the number of strokes per cycle, (4) number of cylinders, and (5) speed of operation.

Mechanical efficiency of an internal-combustion engine is the ratio of brake horsepower to indicated horsepower. Brake horsepower is the actual work an engine is capable of doing, and is found by tests conducted under controlled conditions and from the formula:

$$HP_b = \frac{2\pi LWN}{33{,}000}$$

Where:

HP_b = brake horsepower
L = length of prony brake arm, ft.
W = load on brake arm, lb.
N = Number of engine revolutions per minute

Indicated horsepower is found from the formula:

$$HP_i = \frac{PALE}{33{,}000} \times C$$

Where:

HP_i = indicated horsepower
P = mean effective pressure, lb.- from indicator card
A = area of piston, sq. in.
L = length of stroke, ft.
E = number of explosions per minute in each cylinder
C = number of cylinders

Once the power requirements are determined, selection of engine size is made from manufacturers' horsepower curves, subject to application of certain factors, discussed below. The desired portion of the recommended range of speeds is the one corresponding to the falling part of the torque so that when the load increases within the pumping cycle and the engine slows down, increased torque is available to carry the engine over the peak load.

It is usually advisable to design the drive in such a way that the speed of the engine is not too close to the maximum recommended speed (Part 36). Then if the need arises for increase in pumping speed, the engine can be speeded up, and the need for replacing the sheave is eliminated.

In beam-pumping installations using internal-combustion engines, gas engines are used almost exclusively. They may be four or two-cycle type, multicylinder or "horizontal."

Fuel consumption of a gas engine increases with decrease in degree of loading. Manufacturers furnish information on fuel consumption of their engines. If this information is not available, for approximate estimate, it can be said that a gas engine will use around 9.3 cu. ft. of 1,100-B.t.u. gas per horsepower-hour when loaded to 100% of capacity. Consumption may increase to 10.0 cu. ft. per horsepower at only 40% of maximum load.

Multicylinder engines. Main advantage of a multicylinder engine in oil-well pumping is its relatively low initial cost per horsepower. The engine is light, does not require a heavy foundation, and is easily mounted on crossrails on the pumping-unit skid. But it is inherently complex and requires skilled maintenance. Under field conditions repair frequency may be high, resulting in high operating cost.

Life of a multicyclinder engine is relatively short. They are uneconomical when operated on sour gas. Because of the lack of flywheel inertia size must be carefully selected to carry the engine over peak pumping cycle loads.

The problem of high maintenance cost of multicylinder units has been resolved to some extent by development of the so-called "long-run" engines. The idea behind such an engine was to concentrate on improvement of those components of the engine which require most attention and most frequent maintenance. This approach has been successful and long-run engines are often used in oil-well pumping.

A typical long-run engine is equipped with platinum spark plugs and points, extra-heavy-duty air cleaner, large-size oil filter of the replaceable-cartridge type, control of the oil level in the crankcase, and external reservoir to carry supply of oil. Clutch bearings of such an engine are packed with silicon or lithium-base grease and the cooling system is filled with undiluted diethylene glycol and sealed.

Multicylinder engines are high-speed engines. Some users prefer to limit the piston speed of their engines to 1,000 ft. per minute. Because these engines lack the large flywheel effect and since they are operated on fixed throttle, which makes the engine slow down with imposition of load, substantial service factor is applied in determining the horsepower output at the engine shaft. Many users apply a service factor of 0.65, which is the factor previously included in and now dropped from the API standard for oil-field engines. But improved design of modern engines, use of long-run equipment, and close attention to proper counterbalancing may make the use of a less conservative service factor justified.

Horizontal engines. These engines are characterized by simplicity and ruggedness of construction. They can be repaired on location with resulting low maintenance cost. Their life expectancy is high. They operate on a governor and have high flywheel effect so they run smoothly under the cyclic loads of pumping. However, initial cost is higher than that of multicylinder engines, and they require concrete foundations or special rigid bases. They may, under some conditions, induce shock loads in the pumping system.

Horizontal engines are frequently referred to as slow speed, although modern engines of this type range up to 750 r.p.m. with piston speed up to 900 ft. per minute. They may have a four-stroke or two-stroke cycle of operation. The four-cycle single-cylinder engines have one power stroke for two revolutions of the crankshaft. Heavy flywheels are required and the engine should be running close to maximum recommended speed to assure smooth operation.

In two-cycle single-cylinder engines there is one power stroke for each revolution of the crankshaft. This, together with the flywheel effect, assures smooth running of the engine. In a two-cycle engine the products of combustion are sealed off from the crankcase which further contributes to lowering of maintenance cost. Manufacturer's recommendations should be closely followed regarding size and length of the exhaust pipe to assure efficient two-cycle operation.

Because of these characteristics the horizontal engine can be applied for pumping service closer to their rated horsepower than the multicylinder engine. A service factor of 0.75 is usually applied.

Reed Cobra bits are just one example of the outstanding economies made possible by Reed's continuing program of research and development. These bits are setting phenomenal records all over the oil country in both mud and air drilling. For example—

On a West Texas well, drilling with mud below 12,000 feet, four Reed Cobra bits drilled 2,289 feet in 404½ hours. On an offset well it took 37 tooth bits to drill 2,172 feet in 558 hours. On another West Texas well a Cobra bit set an air drilling record of 3,644 feet in 103 hours.

In Pennsylvania, drilling with air, it is routine for one Reed Cobra bit to complete the hole from surface casing to TD. In this area total footage per Cobra bit regularly exceeds 7,000 feet.

Drilling with mud in East Texas in the tough Travis Peak formation Cobra bits consistently get runs up to 250 feet. Drilling with gas in Mississippi 10 Cobra bits drilled 6,850 feet in 358½ hours. In the same vicinity more than 10 times this number of tooth bits were required to drill the same footage with mud.

There is a Reed man near you. Let him give you the full story on Reed Cobra bits and the Reed Quality Line—tool joints, drill dollars and rock bits.

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Lufkin Chrome Clad® DERRICK Tape (above, left) gives you instant readings on a line that won't rust, chip or peel. An extra-sturdy line, ¼" wide, with hook and ring. Lock-handle frame. Turn handle over, lock line at any point. Available in 100-200′ lengths.

Lufkin "ATLAS" Gaging Tape (above, right) gives you easier reading, too, with durable, jet-black markings on glare-free line. Line is 50% heavier than standard. Has 20-ounce plumb bob, and sturdy lock-handle frame.

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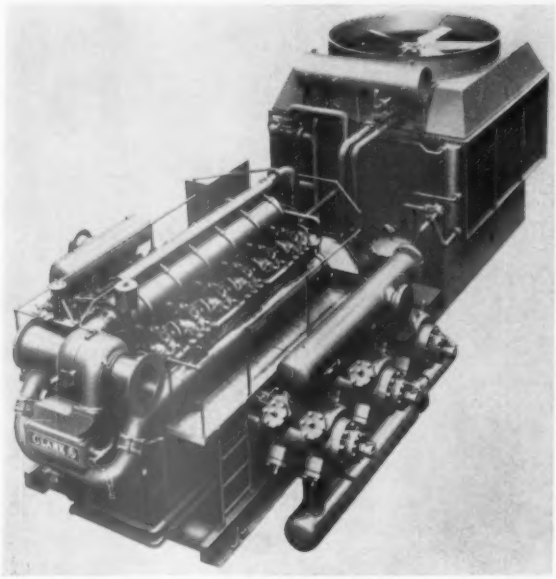
What's NEW . . . in equipment



Integral gas engine powers 1,000-hp. packaged compressor

THE V-type engine-compressor unit comes mounted on a skid 35 ft. long that contains the radiator, scrubber, and other accessories.

The Model TVM-12 unit is rated at 1,000 b.hp. at 600 r.p.m. A companion unit, Model TVM-10, is rated at 825 hp. at 600 r.p.m. Both units are said to be especially suited for field-gas gathering, offshore installations, gas-lift operations, repressuring, recycling plant feeders, refining, secondary recovery, gas transmission, natural-gasoline-plant service, and other operations.

On the larger model, up to six horizontally opposed compressor cylinders with a diameter up to 26 in. can be mounted on either or both sides of the crankcase. The unit has 12 power cylinders.

The smaller model can be fitted with up to five cylinders per unit. It has 10 power cylinders. Source: **Clark Bros. Co., Olean, N. Y., U.S.A.**

Business plane features twin engines

ONE engine in the usual position ahead of the cabin section exerts a pulling force. The second engine mounts behind the cabin area and exerts a pushing force, the maker says. This arrangement is said to assure greater safety.

To permit this engine arrangement the Skymaster plane has twin cantilever tail cones. They extend back from each wing and support individual rudders and a stabilizer. Source: **Cessna Aircraft Co., 5800 E. Pawnee, Wichita, Kans., U.S.A.**

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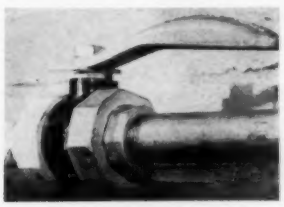


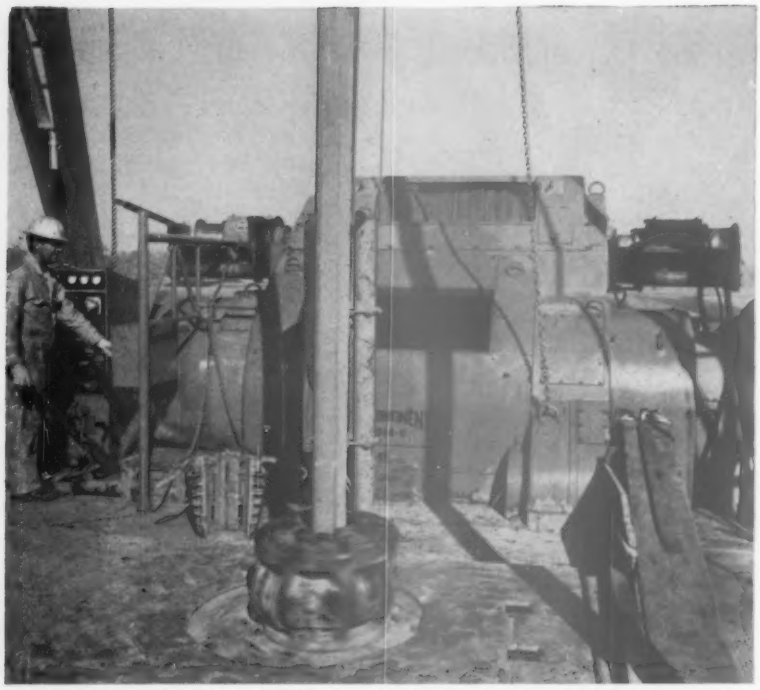
Newest ball valve

. . . features a one-piece forging and built-in union ends. These features are claimed to simplify installation, operation, and maintenance. The valve is designed to control flow of liquid or gas in industrial piping systems.

Only two steps are required to install the valve, the maker says.

Minor pipe misalignment can be overcome by the union ends and does not affect the valve seal which is completely contained in the valve body, the maker states.

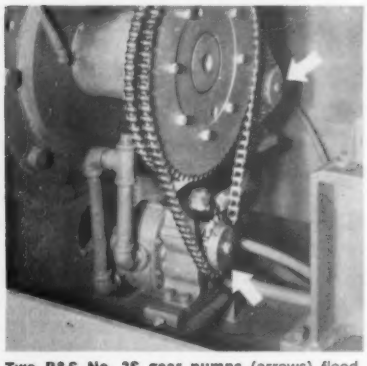
The Petro valve has dual seats. These come in buna-N, neoprene, and teflon. Maximum pressure rating for all valve sizes with buna-N and neoprene seats is 300 psi. The teflon seats are rated to 600 psi. for 1 and 2-in. valves and to 1,000 psi. for ¼ through ¾-in. valves. The valve comes in stainless steel, carbon steel, and brass. Source: **Clayton Mark & Co., 1900 Dempster, Evanston, Ill., U.S.A.**



Drawworks manufactured by Mid-Continent Supply Co., Fort Worth, provide rotating and hoisting action to drill oil wells more than 20,000 feet deep.

Brown & Sharpe lubricating pumps help drilling rigs strike oil

There's a carefully-considered reason why designers at Mid-Continent Supply Co. — world's largest independent oil field supply company — use Brown & Sharpe pumps to lubricate their big "drawworks."



Two B&S No. 3S gear pumps (arrows) flood main chain drive (not shown) with oil. Either separately-driven pump will do the job alone.

They must take every precaution against breakdowns in these giants, rated up to 2000 input HP, that turn and hoist miles-long steel drill "strings."

B&S pumps were first tried by Mid-Continent several years ago — proved so dependable they've been used ever since.

In this customer's own words — "Brown & Sharpe pumps do the job we selected them for; have proved entirely satisfactory over a series of years". Quite a compliment, from this type of company, so highly experienced in pumps!

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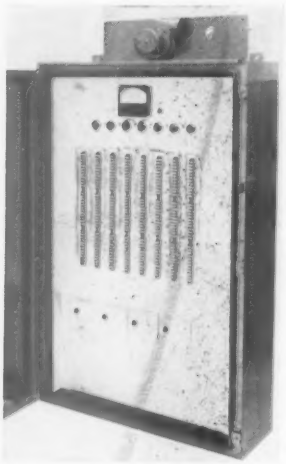
Brown & Sharpe
PRECISION CENTER



Analog computer-controller

. . . for process control, simulation, or operator guidance provides real time control for fractionating towers, butadiene processing, and other multivariable chemical and petrochemical processes, the maker says. Either feed-ahead or feed-back computation techniques may be used.

All computing components are a solid-state type. A usual installation will use operational amplifiers, scaling potentiometers, and logarithmic networks housed in a sealed cabinet measuring 48 in. high, 30 in. wide, and 10 in. deep, or in multiple cabinets if needed. Source: **Dresser Electronics, SIE Div., P. O. Box 22187, Houston 42, Tex., U.S.A.**

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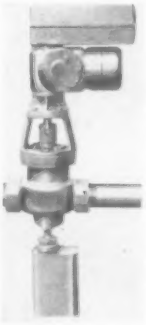
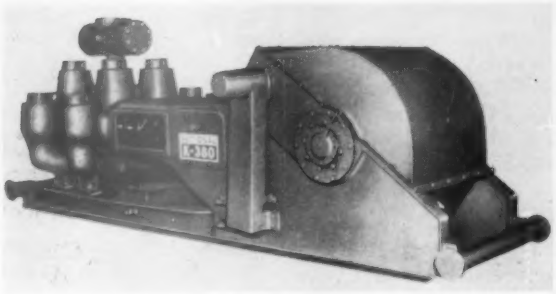
Pipeline liquid sampler



. . . that is claimed to provide a simple yet accurate and convenient means of collecting representative samples of liquid flowing in pipelines is now on the market. The maker says the sampler can be operated either manually or automatically on any pipeline regardless of pressure. Samples are obtained from the unit manually by turning of a handle one-fourth turn. They are obtained automatically with a motor and timing device. Either way, a sample, trapped in a drain plug, flows into a sample container. Source: **Arcco Instrument Co., Inc., 7144 East Condor, Los Angeles 22, Calif., U.S.A.**



Mud pump producers 380-hp.

PUMP delivers 665 g.p.m. at 835-psi. maximum discharge pressure at rated speed of 70 strokes per minute, with a 7¼-in. bore and a 14-in. stroke. With a 4¾-in. liner, it will deliver up to 265 g.p.m. at 2,100 psi.

Features of the K-380 mud pump include a one-piece, cast-steel fluid end, solid-steel connecting rods constructed without splits or bolts, and a crosshead pin designed for simplified removal and reassembly. The valve pots are designed to API 7 specifications and have threaded cover plates. Source: **National Supply Div., Armco Steel Corp., 2 Gateway Center, Pittsburgh 22, Pa., U.S.A.**

•

Plastic-funnel viscometer

. . . for drilling-mud testing is available. The plastic is temperature-resistant and strong to resist breakage. The maker says the funnel maintains complete volumetric accuracy.

Design features include a metal orifice in the discharge tip to provide accurate readings. The funnel reportedly meets API Code RP 29 specifications in all respects. The plastic is said to be a poor conductor of heat and so provides good insulation between hot muds in the funnel and the user's hand while running viscosity tests. Source: **Baroid Div., National Lead Co., P. O. Box 1675, Houston, Tex., U.S.A.**

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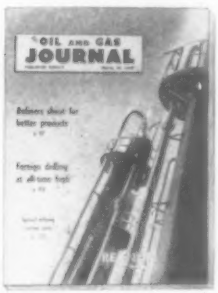

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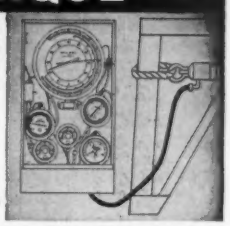
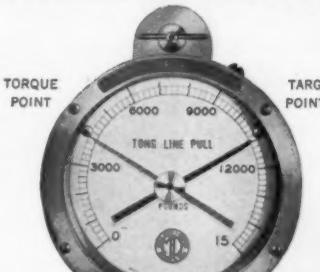
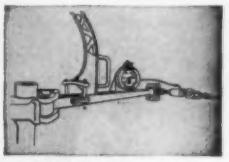




PERMANENT INSTALLATION
The cylinder attached to the back-up line provides torque indication each time collars are run.



PORTABLE INSTALLATION
The torque assembly attached to the tong itself can be used for spot checks on two or more rigs.

ONE GAUGE for torque measurements of all size drill collars, drill pipe, tubing and casing.

ACCURATE AND RELIABLE readings with calibration checks seldom required.

CARE AND MAINTENANCE can be capably done by the drilling crews.

MARTIN DECKER

WRITE FOR DESCRIPTIVE LITERATURE D-6A
MARTIN-DECKER CORPORATION
3431 CHERRY AVENUE, LONG BEACH 7, CALIF.

World's principal manufacturer of Oil Well Drilling Instrumentation

Chromatograph uses widened

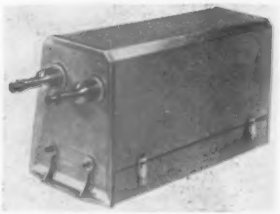
. . . with a new instrument called a Universal linear - temperature programer. The maker says the programer, Model 222, permits faster and simpler solution of difficult analytical problems with gas chromatographs by providing accurate, linear, and reproducible programing of column temperature.

The programer offers 39 heating rates and precise isothermal operation, the maker says. It may be preset to select the following parameters: initial temperature, programing rate in degrees Centigrade, final temperature, and optional automatic cooling to initial temperature at the end of an analysis. Source: **Perkin-Elmer Corp., Danbury Rd., Norwalk, Conn., U.S.A.**

•

Portable densitometer

. . . continuously indicates the specific gravity of such flowing fluids as drilling mud, coatings, additives, and other fluids. The Model 1005-OA instrument was designed so the sensitivity or specific-gravity range will be adjustable to most requirements.



Pneumatically actuated, it can be installed in conjunction with any flow line where specific gravity indication is desired, the maker says. Accuracy is reported to be within ±1% with fluid pressures to 150 psi. and temperatures to 300° F. The unit requires 0.1 c.f.m. of air at a supply pressure from 15 to 400 psi. Indication is independent of flow rate, pressure, or temperature, the maker says. The densitometer measures 10 in. wide by 34 in. long by 15 in. high. Source: **Bell Corp., Box 849, Odessa, Tex., U.S.A.**

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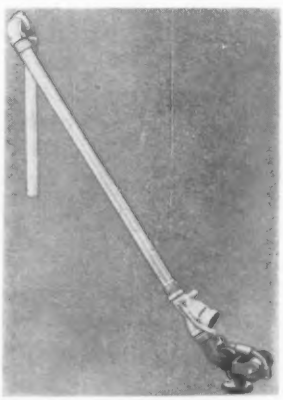


Latest loading arm

. . . a spring-balanced type, is designed to withstand heavy use and rough treatment, the maker says. The packing elements come in several materials to handle a variety of fluids. They can be replaced without removing the arm from the rack or without disturbing the bearings. A snubber spring absorbs upward thrust as the arm is returned to its rest position.

Suited for loading of tank trucks and cars with petroleum or chemical products, the loading arm comes in six models and two sizes: 3 and 4 in. Source: **Continental-Emsco Co., P. O. Box 359, Dallas, Tex., U.S.A.**

Have you ever considered the risk you're taking if the burner units on your leases provide less than 100% protection against flashback fires? Each year lease equipment worth thousands of dollars is destroyed because of faulty or inadequately protected burners.

The best way to eliminate fire control problems is to specify ENARDO Burners with Flame Arrestors for your gas-fired line heaters, oil treaters and dehydration heaters. Both the in-line and angle models feature an arrestor cell of aluminum alloy wound in a tight "honeycomb" arrangement to prevent flashbacks. The cells are easily removable to permit cleaning and periodical checking at the installation.

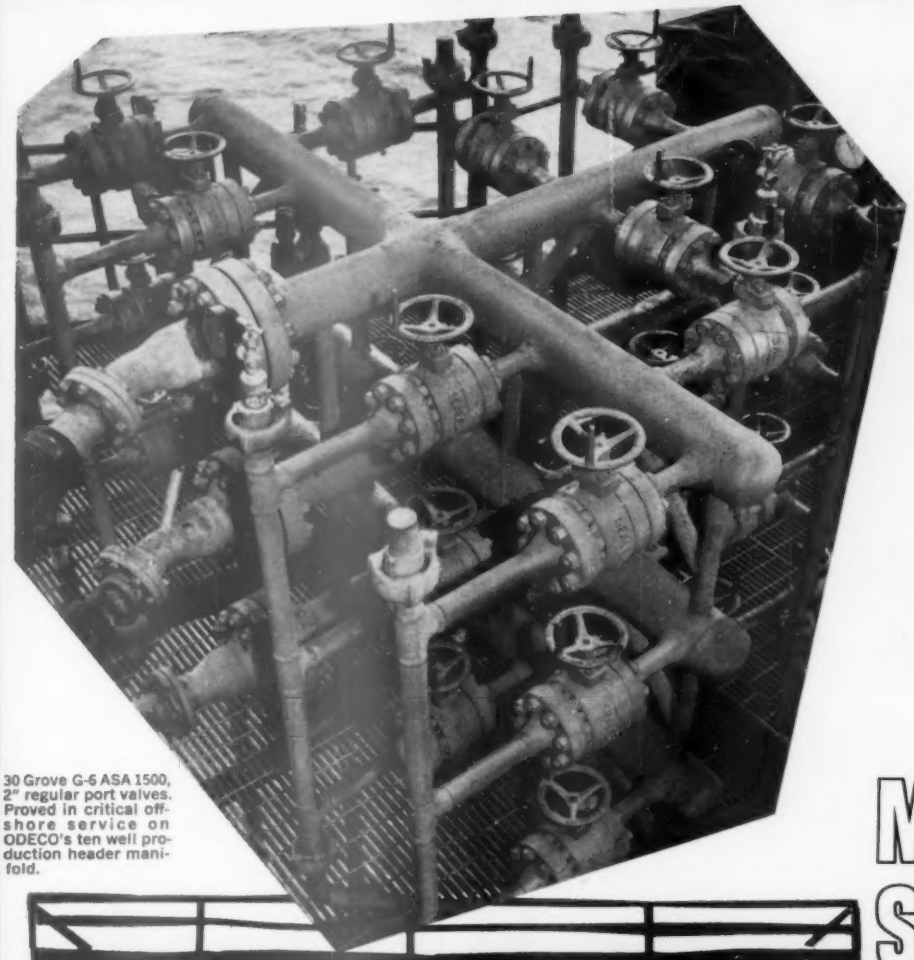
With ENARDO Burner Assemblies, you can also forget about freeze-ups in cold weather—both the burner and pilot orifices are inside the housing. Control valves are outside for easy access and an outside door permits primary and pilot adjustment. The complete unit, available in capacities from 45,000 to 6,000,000 BTU/HR, is readily adaptable to your vessel.

Don't take chances with your lease equipment—insist on dependable ENARDO Burners with Flame Arrestors.

SPECIFY ENARDO BURNERS WITH FLAME ARRESTOR CELLS

Call , write or wire Enardo Manufacturing Co. for further information..

ENARDO manufacturing co.
BOX 1647 • TULSA, OKLAHOMA



30 Grove G-6 ASA 1500, 2" regular port valves. Proved in critical offshore service on ODECO's ten well production header manifold.

FIRST COMPACT GATE VALVE FOR MANIFOLD SERVICE

With Flow Characteristics Superior to Plug Valves.

Tnough reduced to a compact 14⅜" overall height, new Grove G-6 valves provide a round opening for ideal flow characteristics. G-6 Regular Port Valves feature field proved Grove Seal-"O"-Ring® system that provides a primary, positive metal-to-metal seal backed up by o-rings to assure bubble-tight closing. And because G-6 valves never need lubrication or sealing compounds, these maintenance costs are eliminated. Designed for flow lines, tubing and casing heads, wing valve and manifold services. 2" size in ASA 900, 1,500 and API 3,000#, 5,000# wog.

GROVE VALVES

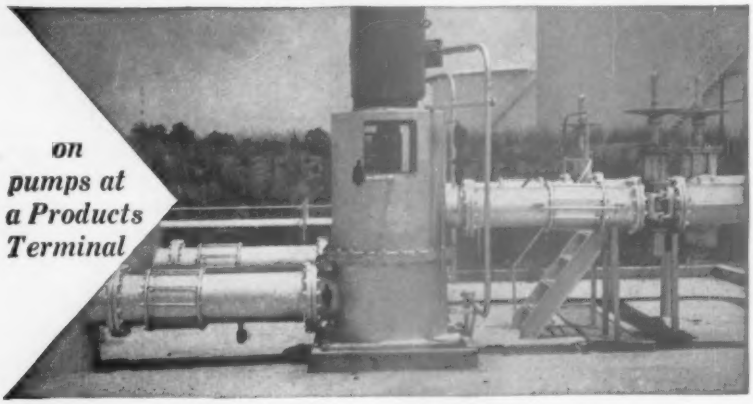
GROVE VALVE AND REGULATOR COMPANY

a subsidiary of Walworth

6529 Hollis Street, Oakland 8, California

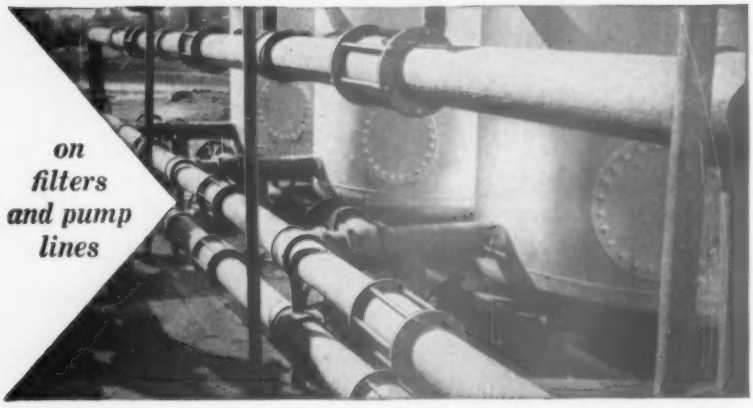
Offices throughout the U. S. and in Western Canada

Dresser® Couplings—



on pumps at a Products Terminal

easy, bottle-tight...



on filters and pump lines

safe, permanent joints!

Dresser Couplings are easily installed and bottle-tight for life! The specially compounded Dresser Gasket provides rugged "give and take" to absorb vibration, settlement and other stresses that might cause damage. And there's no pipe threading. With plain end pipe, any workman can install Dresser Couplings in an average two man-minutes per bolt *using only a wrench.* And even with pipe deflection up to 4°, you still get a perfect Dresser-Coupled joint. Send for Dresser Catalog No. 531; it contains more detailed information and complete specifications on *all* Dresser Couplings, Fittings and Pipe Repair Products.

• GET THEM FROM YOUR LOCAL OIL FIELD SUPPLY STORE

Bradford Pennsylvania

Chicago
Houston
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S. San Francisco
Toronto & Calgary

DRESSER MANUFACTURING DIVISION

ONE OF THE DRESSER INDUSTRIES

Tubingless-completion equipment

. . . in a new line includes such features as a choice of slip or mandrel suspension of production strings, ample openings for centralizers or turbilizers, a choice of screwed, flanged, or solid-block valves, and a full range of pressure ratings up to 10,000 psi., the maker says.

The equipment is said to permit running or hanging tubing through the blowout-preventer assembly, running multiple strings separately or together, hanging strings without spacing out, hanging one to four strings in the same wellhead, and convenient testing of connections made up in the field.

The equipment reportedly can be used with as many as eight strings of tubing. A special tubing head is available for 1½-in. and smaller tubing strings. Christmas-tree assemblies using sector-shaped flanged connections (crescent flanges, triflanges, or quadflanges) permit removing any valve without affecting production from other zones, the maker says. Source: **Oil Center Tool Co., Box 3091, Houston, Tex., U.S.A.**

•

New epoxy coating

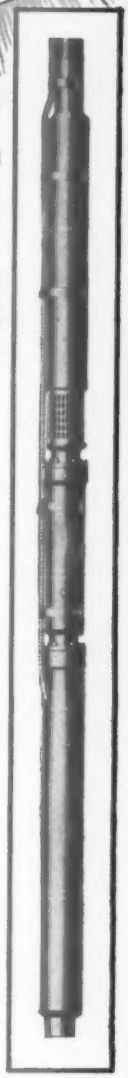
. . . can be applied to any surface under all weather conditions, the maker claims. The product, tradenamed PlastXcoat, comes in 20 colors. Application can be by spray, roller, or brush. The maker says the coating has been successfully applied to wood, plastic, concrete, brick, glass, and aluminum. Only one coat is needed on most applications, the maker states. Source: **Bradco Plastics, Inc., 4916 Kirby Drive, Houston, Tex., U.S.A.**

•

Newest vibrating screen

. . . features an underslung screen mounting which the maker claims positively prevents screen "whip-

INCREASE PROFITS WITH REDA Submergible PUMPS



REDA GIVES YOU THESE COST SAVING FEATURES AND DOES THE JOB BETTER!

- **Lower cost for installation, operation and maintenance.**
- **250 to 18,000 BPD capacities**
- **Depths to 10,000 ft.**
- **Corrosion-resistant construction**
- **Long life — dependable service**
- **A complete line to meet pumping requirements**

and

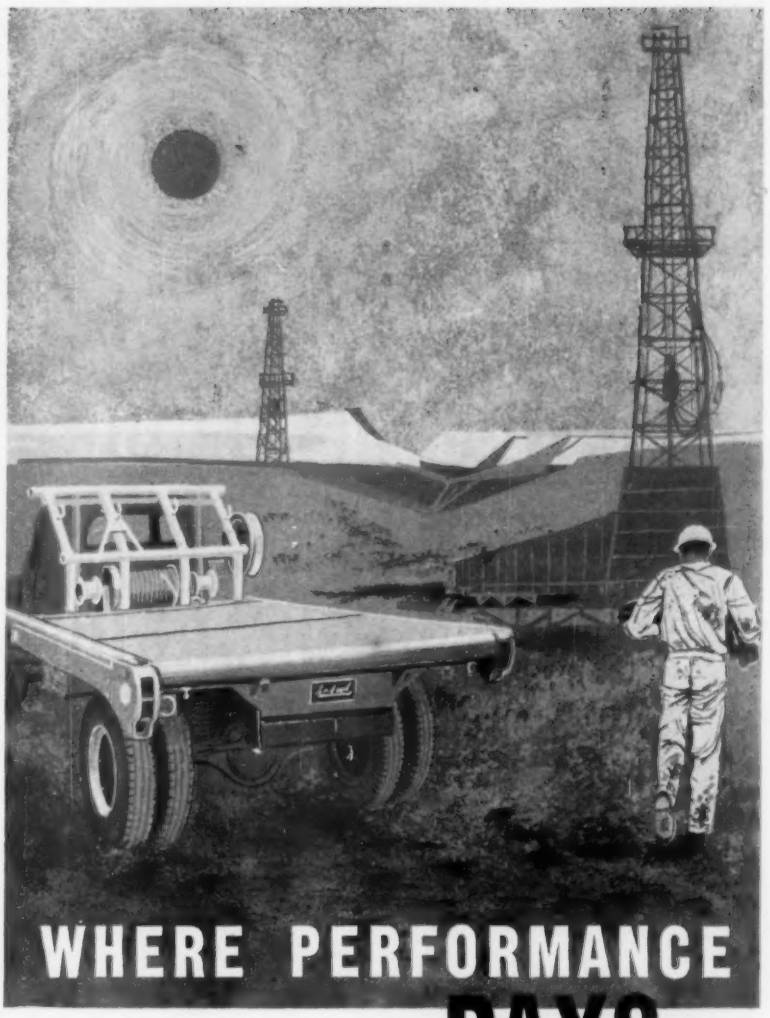
INVESTMENT COST IS FAR LOWER WHEN YOU CHOOSE REDA FOR YOUR PUMPING NEEDS.

Write or call for more information. Reda engineers will be pleased to assist and help plan your operations.

SIGN OF QUALITY SUBMERGIBLE REDA PUMPS

REDA PUMP CO.
BARTLESVILLE, OKLAHOMA

Manufacturers of submergible motors and pumps for over 35 years — for oil, brine and water wells, gasoline and jet fuel —



WHERE PERFORMANCE PAYS

From the moment you order a Leland truck body . . . its quality-controlled workmanship and diversified applications begin to pay off for you. Look your new Leland body over closely and you'll see the Leland difference in durability and reliability.

Tilt trailers . . . welding bodies . . . fifth wheel bodies . . . pole trailers . . . the Leland "packaged unit" with the famous Tulsa Winch . . . there's a Leland body to fit your particular needs, and Leland's famous "parts depot" is expertly stocked and staffed to supply you with replacement parts on a moment's notice. When and WHERE PERFORMANCE PAYS — Leland is on the job.

Leland's truck equipment center offers dump bodies, service, platform and stake bodies . . . whatever your needs might be!

ALSO — complete parts and service on **Cleveland Trenchers . . . Gardner-Denver . . . C-M-C . . . Blaw-Knox . . . Thew-Lorain . . . Bros Road Equipment . . . Tulsa Winches**

Leland
EQUIPMENT COMPANY
Oklahoma City • TULSA • Longview, Texas

SOLID CONFIDENCE

BUILT ON

SOLID PERFORMANCE

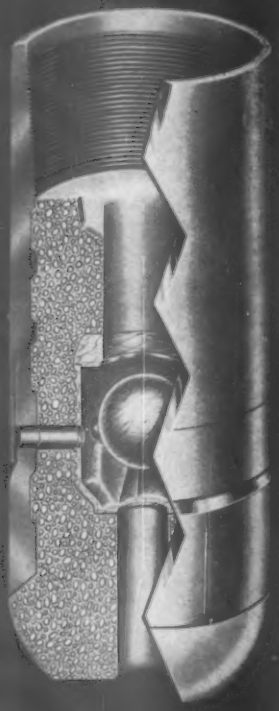
YEAR

AFTER

YEAR

AFTER

YEAR



A complete, dependable line of primary cementing equipment available to you . . . "Through Your Supply Store".

LARKIN PACKER COMPANY

DIVISION KOEHRING COMPANY

WAXAHACHIE, TEXAS

LARKIN

...Through Your Supply Store

LARKIN LEADERSHIP HAS BEEN EARNED BY YEARS OF DEPENDABLE PERFORMANCE

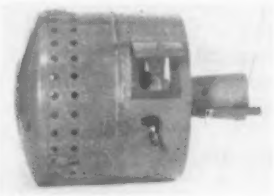
ping" and "flexing." A system is provided for maintaining correct tension on the screen cloth.

According to the maker, the Rumba vibrating-screen assembly gives controlled distribution of material over the screen. Whether wet or dry, all material is said to be evenly distributed over the entire screening area. Source: **Hutchinson Mfg. Co., P. O. Box 9335, Houston 11, Tex., U.S.A.**

•

Burners for line heaters

. . . oil treaters, and dehydration heaters recently developed feature flame-arrestor cells easily removable to permit cleaning and periodic checking at the installation. The



burners are built as a complete unit and are readily adaptable to any vessel, the maker says.

The flame cell is of aluminum alloy wound in tight honeycomb arrangement to prevent flashback fires. Burners with flame arrestor cells can be obtained in both single and twin fire-tube types in the in-line models. Maximum gross heat-release ratings range from 45 to 6,000 M. B.t.u. per hour. Source: **Enardo Mfg. Co., Box 1647, Tulsa, Okla., U.S.A.**

•

Aluminum electrical fittings

. . . contains less than 1% copper which, the maker claims, makes them ideally suited for use in environments subjected to severe corrosive conditions. Usable with either ferrous alloy or aluminum conduit, the fittings form a coating of corrosion-resistant aluminum oxide.

The fittings reportedly weigh about 33% less than similar fittings of other metal content. The line of aluminum fittings include junction boxes, switch covers, receptacles, and lighting fixtures. All have tapered threads. Source: **Appleton Electric Co., 1701 Wellington Ave., Chicago 13, Ill., U.S.A.**

BONNEY WELDOLETS

cut corners safely...

ON ALL 90° BRANCH PIPE CONNECTIONS

Competitive economic times like these make cost cutting mandatory. Reduce piping costs by using Weldolets instead of welding tees for all full size and reducing branch connections. Contractors and owners are saving thousands of dollars on piping jobs by switching to Weldolets. Are you? Write for information.

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ALLOY
for all services

BONNEY FORGE AND TOOL WORKS, ALLENTOWN, PA.

What's NEW

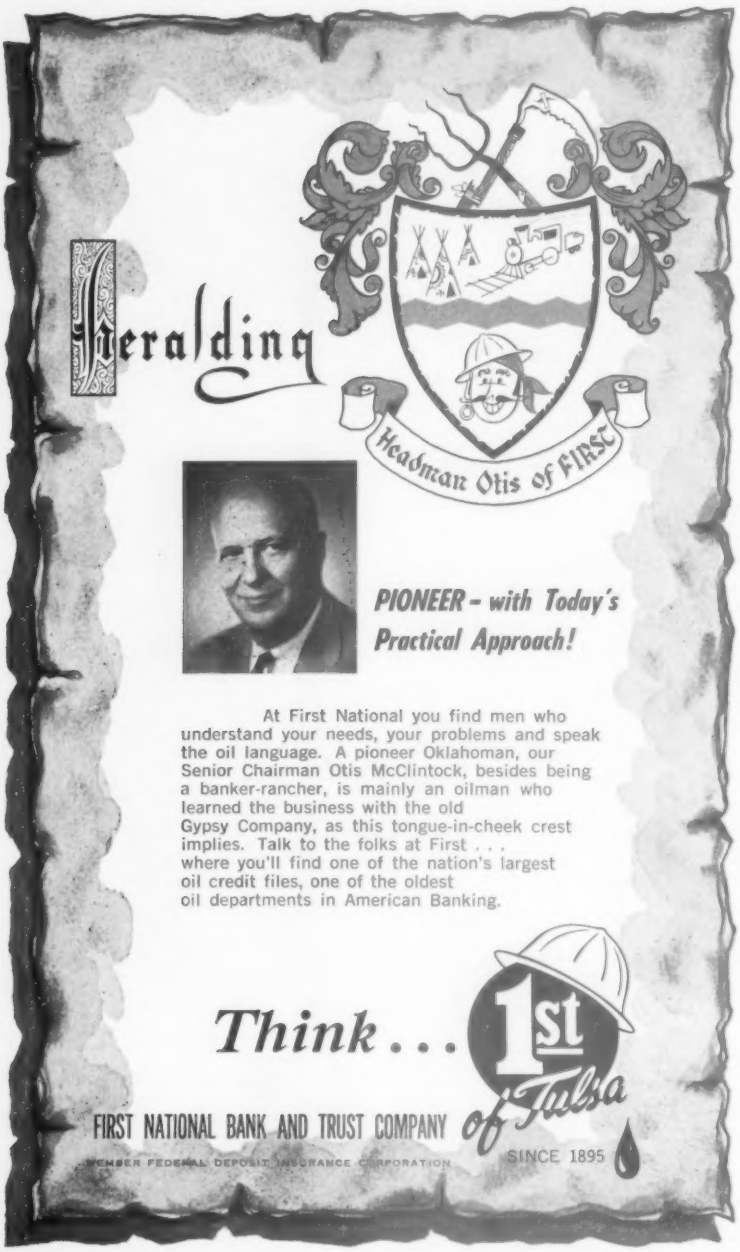
. . . in literature

Insulation catalog

. . . now available, lists thermal insulations for various types of commercial and industrial requirements in applications ranging from −400° to 3,000° F. Catalog IN-244A contains individual, thumbtabbed sections devoted to industrial and high temperature, insulating firebrick and refractories, finishes and weatherproofing materials, and miscellaneous insulations. Information on each product consists of an application photo, description, available forms or types, advantages to users, and detailed specification data, including compliance with government specifications and ASTM standards. Source: **Johns-Manville Sales Corp., 22 E. Fortieth St., New York 16, N. Y., U.S.A.**

Compressors

. . . for gas gathering, gas lifting, repressuring, and booster service are described in a new bulletin. The 10-page publication covers the W-62 (two-cylinder) and W-64 (four-cylinder) balanced-opposed models, both matched to natural-gas engines. The bulletin details improvements in compressor design, construction features, and components. Two pages of Bulletin 124 are devoted to specifications, cylinder sizes, and dimensions of engine-compressor packaged units. Source: **White Diesel Engine Div., White Motor Co., Springfield, Ohio, U.S.A.**


Heralding
Headman Otis of FIRST
PIONEER - with Today's Practical Approach!
At First National you find men who understand your needs, your problems and speak the oil language. A pioneer Oklahoman, our Senior Chairman Otis McClintock, besides being a banker-rancher, is mainly an oilman who learned the business with the old Gypsy Company, as this tongue-in-cheek crest implies. Talk to the folks at First . . . where you'll find one of the nation's largest oil credit files, one of the oldest oil departments in American Banking.
Think . . . 1st of Tulsa
FIRST NATIONAL BANK AND TRUST COMPANY
MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION
SINCE 1895

Controllers publication

. . . covers the complete line of ElectroniK controllers, both pneumatic and electric. Illustrated Catalog C-15-2a gives new modular design features as well as the new proportional - plus - reset - plus - rate - control units, partial chart listings, and pneumatic and electric contact control forms. Source: **Industrial Div., Minneapolis - Honeywell Regulator Co., Wayne and Windrim Aves., Philadelphia 44, Pa., U.S.A.**

Sizing charts for control valves

. . . and sliding-gate regulators are contained in new four-page Bulletin JSC-1. Charts cover steam, liquid, and gas service. A crossreference method of compiling makes sizing easy by eliminating the need for rulers, formulas, or sliderules. Technical data (applying to all makes of valves) tells how to adjust sizing for variations in pressure, temperature, viscosity, or specific gravity. Source: **OPW-Jordan Corp., 6013 Wiehe Rd., Cincinnati 13, Ohio, U.S.A.**

Logging program

. . . is described in a booklet which lists major areas of oil activity in the United States in geographical subdivisions for easy reference. The program is designed to aid logging users in selecting the right service for the information desired. Listing all Lane-Wells open-hole and cased-hole logs, the program shows at a glance the correct log or combination of logs for uses under various hole conditions. Source: **Lane-Wells Co., Box 1407, Houston 1, Tex., U.S.A.**

Steam-trap selector

. . . complete with piping diagrams for petroleum-processing equipment

has just been published in a 32-page form. It contains information on how to select, size, and install steam traps on petroleum-processing equipment. Included are 10 pages of trap recommendations for 52 types of processing equipment, 26 capacity tables, and piping diagrams showing proper steam trapping of polymerization, vacuum distillation, deasphalting-dewaxing, desulfurization, alkylation, and lube-oil-refining units. Source: **Yarnall-Waring Co., 7700 Norwood Ave., Philadelphia 18, Pa., U.S.A.**

Electrical-fittings catalog

. . . details applications of condulets in hazardous locations, quotes articles 500-503 and 510-517 of the National Electrical Code, and offers recommendations for condulets meeting various code requirements. Bulletin 2722 presents more than 300 product photographs, installation photos, and drawings. The publication should prove a valuable reference for planning electrical installations in hazardous locations. Source: **Crouse-Hinds Co., 1347 Wolf St., Syracuse 1, N. Y., U.S.A.**

Aluminum pellets for fracturing

. . . oil and gas wells are described in a new brochure just released. It cites field and laboratory results which illustrate how the pellets—called Frac-Shot—resist crushing and sinking into formations. Because of aluminum's malleable properties, the pellets deform slightly under pressure rather than crush. The brochure includes pellet specifications, particle concentration, pictures, and drawings. Source: **Reynolds Metals Co., Box 2346-ZA, Richmond 18, Va., U.S.A.**

Reinforced-concrete construction

. . . system, using steel domes in 2-ft. modules, speeds building time and saves material and labor costs over comparable-strength flat-slab construction, according to a new four-page brochure now available. It describes the system, the steel domes, and formwork and utility layouts. Included are comprehensive typical safe-load tables and typical layouts of ceilings and floors using the system of construction. Source: **Grid Flat Slab Corp., 761 Dudley St., Boston 25, Mass., U.S.A.**

Pipe inspection

. . . services of Plastic Applicators, Inc., along with the firm's quality-control processes, application methods, and research facilities, are presented in a new six-page brochure. It also details products and services of Plastronics Division, the electronics and instrumentation division; and Rubber Applicators, the molded-rubber products and rubber-lining organization. Source: **Plastic Applicators, Inc., Box 7631, Houston, Tex., U.S.A.**

Dial thermometers

. . . of the bimetal, actuated type, are illustrated and described in new 20-page Catalog 155. Designed for use by plant-operating personnel, each thermometer type is shown with construction features, sizes, stem lengths, dimensions, weights, and specifications. Source: **Manning, Maxwell & Moore, Inc., 215 E. Main St., Stratford, Conn., U.S.A.**

"Floliight" Floodlights
"Floliight" Generator Control Panels
"RUMBA" Shale Shaker
"Floair" Forge Blowers
"Floliight" Power Distribution Panels
Electric Motors and Motor Controls
"Floliight" Power Distribution Systems for Camps
"Floliight" Derrick Lighting Systems
IT'S OUR PRACTICE TO MANUFACTURE THE FINEST EQUIPMENT AVAILABLE. THAT'S WHY YOU'LL FIND THESE HUTCHISON PRODUCTS IN USE ALL OVER THE WORLD!
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▶▶▶ Equipment Men Notes

Lewis J. Bicking, Jr., becomes

L. J. Bicking, Jr.

. . . sales manager of Merla Tool Corp., Dallas manufacturer of gas-lift equipment, replacing C. D. Fletcher who retired. Bicking, formerly Merla's assistant sales manager, is a member of AIME and the Sales Promotion Executive Association. Fletcher, after 14 years with Merla, will enter business in Fort Worth as an independent gas-lift-systems consultant.

Two new divisions established

W. H. Bolin

. . . by Manning, Maxwell & Moore, Inc., from the company's former Consolidated Ashcroft Hancock Division. W. H. Bolin has been appointed general sales manager of the newly formed Valve Division. Other sales executives within this division include R. F. Attner, marketing manager for Consolidated valves; T. J. Naughton, product manager for Hancock valves; J. C. Rainey, mid-eastern (Pittsburgh) district manager; D. D. Clayton, southeastern (Atlanta) district manager; and A. J. Pfister, Pacific Coast (Los Angeles) district manager.

For the Gauge & Instruments Division, F. J. Murphy is assistant general sales manager; M. S. Palmer, director of OEM marketing; E. M. Dederer, assistant director of OEM marketing; L. F. Kirby, product manager for "American" industrial instruments; and N. C. Rardon, midwestern (Chicago) district manager.

Westinghouse Electric appoints

. . . Charles W. Mills as manager of market development in the apparatus sales organization; John G. Aldworth to succeed Mills as manager of the electric utility sales department; and Daniel E. Bockover to the newly formed post of residential advertising manager.

Aldworth was formerly sales manager of the power control and communications department at East Pittsburgh. Bockover's duties will include coordination of advertising activities within Westinghouse divisions concerned with the residential market.

National Supply names managers

. . . at three Texas stores. H. F. Dunaway, field salesman at Snyder, Tex., takes over store duties at Big Spring replacing Oran D. Nash. Nash moves to the Abilene store. Herbert N. Seigler, store manager at Abilene, has been shifted to Wichita Falls.

Dunaway started at the Odessa store in 1957 and later served at the Hobbs and Eunice, N. M., stores. He has been a field salesman at Snyder since 1960. Nash started at Odessa in 1955, was transferred to Big Spring in 1956, and became store manager there in 1959. Seigler began at Abilene in 1957, became store manager at Graham in 1959, and at Abilene last year.

Schlumberger moves offices

. . . in its southwest area to new quarters at 1108 First City National Bank Building in Houston. The southwest area, under the direction of manager Alan Morazzani, includes Schlumberger's South Texas Gulf Coast divisions. Included in the move was the computing center for all Dipmeter logs in the area. Offices of the Texas Gulf Coast division, supervising operations from Wharton and Matagorda counties northward, remain in the Bank of the Southwest Building in Houston.

W. G. Pitzel joins Pennant, Inc.

. . . as sales and service representative for the Tulsa firm. He will work in cooperation with salesmen of Bradford Motor Works, who are distributors for the Pennant safety weight-control indicator. Pitzel was formerly with Franks Division of Cabot Corp. for 18 years as district sales manager in West Texas and Oklahoma.

DESTINED FOR KIRKUK, IRAQ, is a large consignment of line traveling, cleaning, and wrapping equipment that Crose-Perrault Equipment Corp., Tulsa, recently sold to Iraq Petroleum Co. From left to right are: T. J. Behrenfeld, Crose-Perrault director of overseas operations who headquarters in New York City; A. Long, managing director of A. Long & Co., Ltd., London, England, and also Crose-Perrault representative for the British Isles; and John Manley, Crose-Perrault's export sales manager. Long, who was instrumental in consumating the sale, visited Tulsa in conjunction with an over-all tour of the United States and Mexico.

National Supply opens new store . . . at McCook, Neb., to serve oil operators in 25 Central Nebraska counties and the northern half of Cheyenne, Decatur, and Rawlins counties, Kansas. The area was formerly served by National's Plainville, Kans. store. V. R. Graham is store manager.

The division of Armco Steel Corp. also announced that it is moving its office in Chicago to the Kemper Building from the McCormick Building. The Armco Division, Sheffield Division, and Armco Drainage & Metal Products, Inc. also have quarters in the Kemper Building.

William A. Finn is elected v.p. . . . and group executive of Worthington Corp., moving up from his former post of general manager of the company's Harrison, N. J., division. A. Edwin Carter, now vice president of manufacturing, takes on Finn's former duties.

W. A. Finn

A. E. Carter

Finn first joined Worthington in 1926. He has served as general manager of European operations, general manager of the Holyoke, Mass. division, and general manager of the Harrison division.

Carter joined Worthington in 1958 as vice president of manufacturing. Previously he was manager of Ford Motor Co.'s plant at Rawsonville, Mich.

New company formed in Houston . . . to purchase and lease all types of production equipment. The firm—Inelco or International Equipment Leasing Co.—was organized by J. M. Lebeaux, former manager of research and development at Oil Center Tool Co., and Bruce and Curtis Calder, Jr., partners operating Horizon Oil & Gas Co., of Dallas.

Under the leasing program, the operator specifies the equipment, vendor, and price desired. Inelco then purchases the equipment according to the producer's instructions and delivers it to a specified location.

J. Philip Murphy elected prexy . . . of Yuba Consolidated Industries, Inc., by Yuba directors, following the resignation of John L. McGara, president and board chairman the past 4 years. Murphy was also elected to the Yuba board of directors. He formerly was president of Judson Pacific - Murphy Corp., Emeryville, Calif., a structural-steel fabrication and erection firm which was acquired by Yuba in 1958.

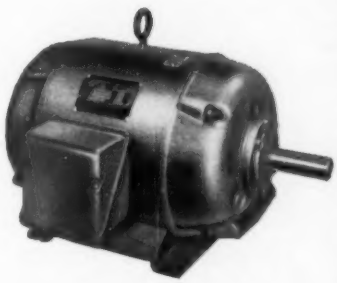
Minneapolis-Honeywell sets up

. . . a separate computer department in its Special Systems Division and appoints Samuel D. Harper as manager. The department will be responsible for engineering and marketing programs for integrated industrial process - control systems incorporating the Honeywell 290 digital computer.

Most recently, Harper was direc-

Water can't harm R&M "All Weather 40" Oil Country Motors!

Robbins & Myers Oil Country Motors are fully protected in all kinds of weather because moisture is locked out. R&M "weatherizing" includes: steel parts undercoated with a rust-resistant . . . iron parts treated with anti-corrosion primer . . . windings twice varnish-dipped and baked. Terminal box is gasketed . . . power leads sealed at shell. Baffles lock out wind-driven rain. Rodent screens are factory-installed. Yet you pay no extra for these dependable R&M 40° heat rise motors! Write today for Bulletin 520-OG



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ROPER PUMPS

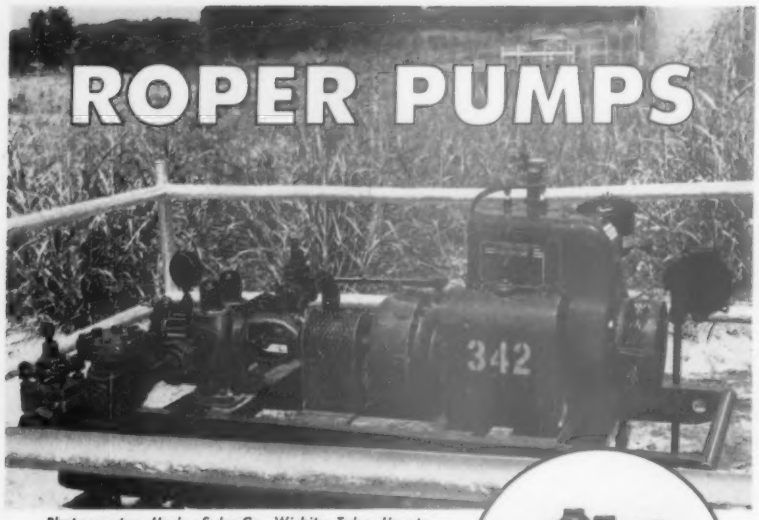
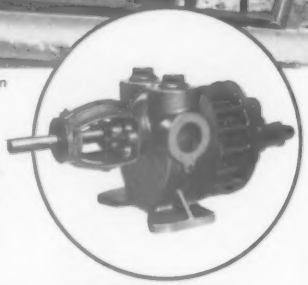


Photo courtesy Harley Sales Co., Wichita, Tulsa, Houston



Series F Model 1F-50 Spec. 5

at work moving crude oil from lease to pipeline system

• OUTPUT CAPACITIES: 1-300 GPM • OPERATING PRESSURE 300 PSI

This precision-built Roper Series F serves as the gathering line unit moving crude oil from a producer's lease to the pipeline system. The Model 1F-50 with packed box is regulated for 60 barrels per hour output at discharge pressure of about 200 psi. It is direct-connected to a Wisconsin two-cylinder engine, with both pump and engine mounted on structural steel skid for easy field installation. Series F pumps have four-port design for eight optional piping arrangements—four clockwise, four counter-clockwise—saving time and cost on installation. Other units in Roper's line of oil field pumps include low pressure, high capacity Series 3600 for field storage and general transfer, and the Series H for high pressure gathering line applications.

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- **DEEP PACKING BOX** has split gland and is easy to repack with split rings without disconnecting piping or drive.
- **BUILT-IN SLEEVE-TYPE** relief valve is available in all sizes. Adjusts in three increments. Standard 300 psi setting or set to your requirements.
- **SUPPORT** for pumping gears comes from four flange-type bearings. Positive displacement pumping action circulates liquid pumped through oil grooves in bearings for cooling, lubrication, prolonged service.
- **BACKPLATE** is built to permit field servicing and repair without disturbing piping or drive.

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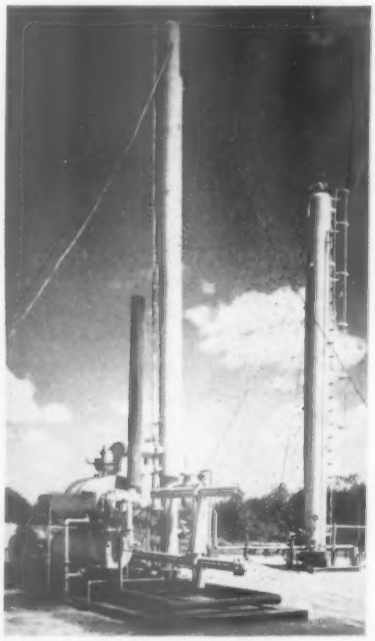

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tor of sales engineering for Honeywell's Electronic Data Processing Division. From 1958 to 1960 he was project director on the design and early stages of production of the Honeywell 800. He also was prominent in development of the Honeywell 290's magnetic-switching techniques.

Continental-Emsco Co. promotes

. . . Raleigh Hortenstine, Jr., to the headquarters staff in Dallas as vice president and assistant to the president, and names R. C. Rieder as vice president in charge of manufacturing and engineering.

Since 1954 Hortenstine has been vice president in charge of Gulf Coast operations, with offices in Houston. He joined C-E in 1934, was advanced to store manager at

R. Hortenstine, Jr.

R. C. Rieder

Golden Meadow, La., salesman at Houma, La., assistant district manager at New Iberia, La., and division manager over the South Louisiana and South Texas areas.

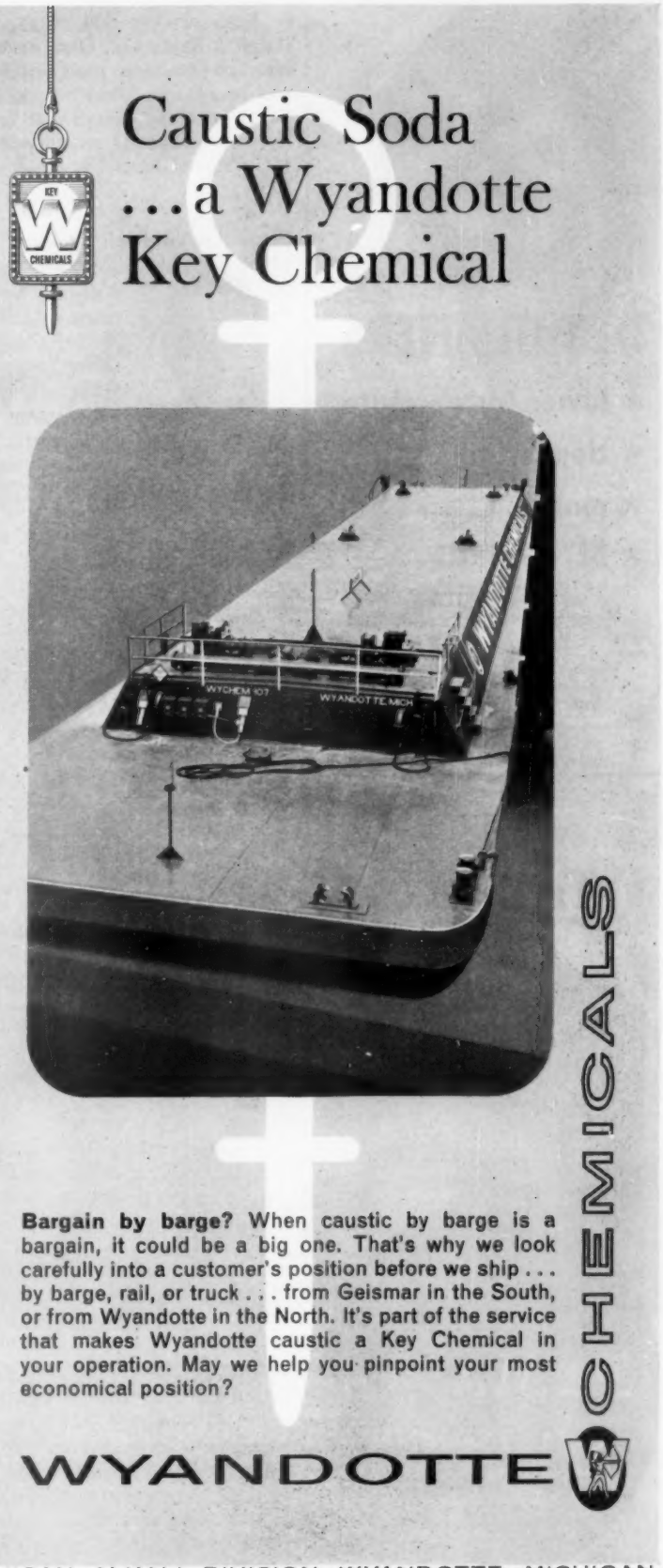
Rieder was formerly vice president and works manager of Baker Perkins, Inc., manufacturer of chemical mixers and processing machinery. Additionally, he served as a director of the company at Saginaw, Mich., since 1955.

Lubke becomes superintendent

. . . of production at Odessa, Tex., for Pipe Inspectors Division of Plastic Applicators, Inc. John Lubke joined the division last year when Plastic Applicators purchased Trip Check, Inc., in which he was a partner. Engaged in inspecting oilfield-tubular goods since 1948, his previous employers include Tuboscope Co., Sperry Western Co., and Telle-Vue Inspection Co.

Crane Co. appoints Eugene Kolb

. . . as vice president and general manager of its subsidiary, Chapman Valve Mfg. Co. He will headquarter at Indian Orchard, Mass. Previous-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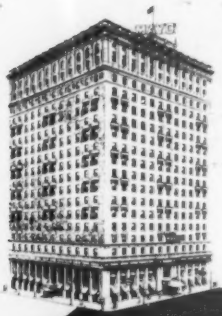

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ly Kolb was general manager of Ralph J. Stolle Co., Ohio manufacturer of machine tools, hydraulic and pneumatic cylinders, and other metal products. Before that he was manager of special product sales at International Steel Co., Evansville, Ind.

Leroy (Lee) Bidwell, Jr. joins

L. Bidwell, Jr.

. . . Southwest Industries, Inc., as manager and senior sales engineer of the firm's New Orleans branch office, announces E. C. Broun, vice president and director of sales. Bidwell will coordinate sales and service of equipment for the petroleum and chemical industries throughout New Orleans and the Louisiana Gulf Coast areas.

Bidwell has been associated with Diversa, Inc., New Orleans, where he served as production superintendent; Sohio Petroleum Co., where he worked as an engineer on projects of water flood, evaluation, production, drilling, and construction; and Otis Engineering Corp., where he was assigned as a sales engineer in Louisiana.

Arnold H. Stephens is appointed

. . . by Grove Valve & Regulator Co. as southern California district manager for sales of valves and regulators, according to George E. Doty, vice president and general sales manager. Grove is the Oakland, Calif., subsidiary of Walworth Co.

Stephens, who will locate in Los Angeles, has an extensive background in the design, development, and manufacture of pneumatic and hydraulic control devices. He rejoins Grove after serving as a consultant in the application of pneumatic controls and prior to that as a supervisor for Hughes Aircraft Co.

Union Carbide Olefins Co. opens

. . . new sales offices in Chicago and Memphis—the second and third district offices established by the company within the past year. An office in Cleveland has been in operation for several months. The company is a division of Union Carbide Corp.

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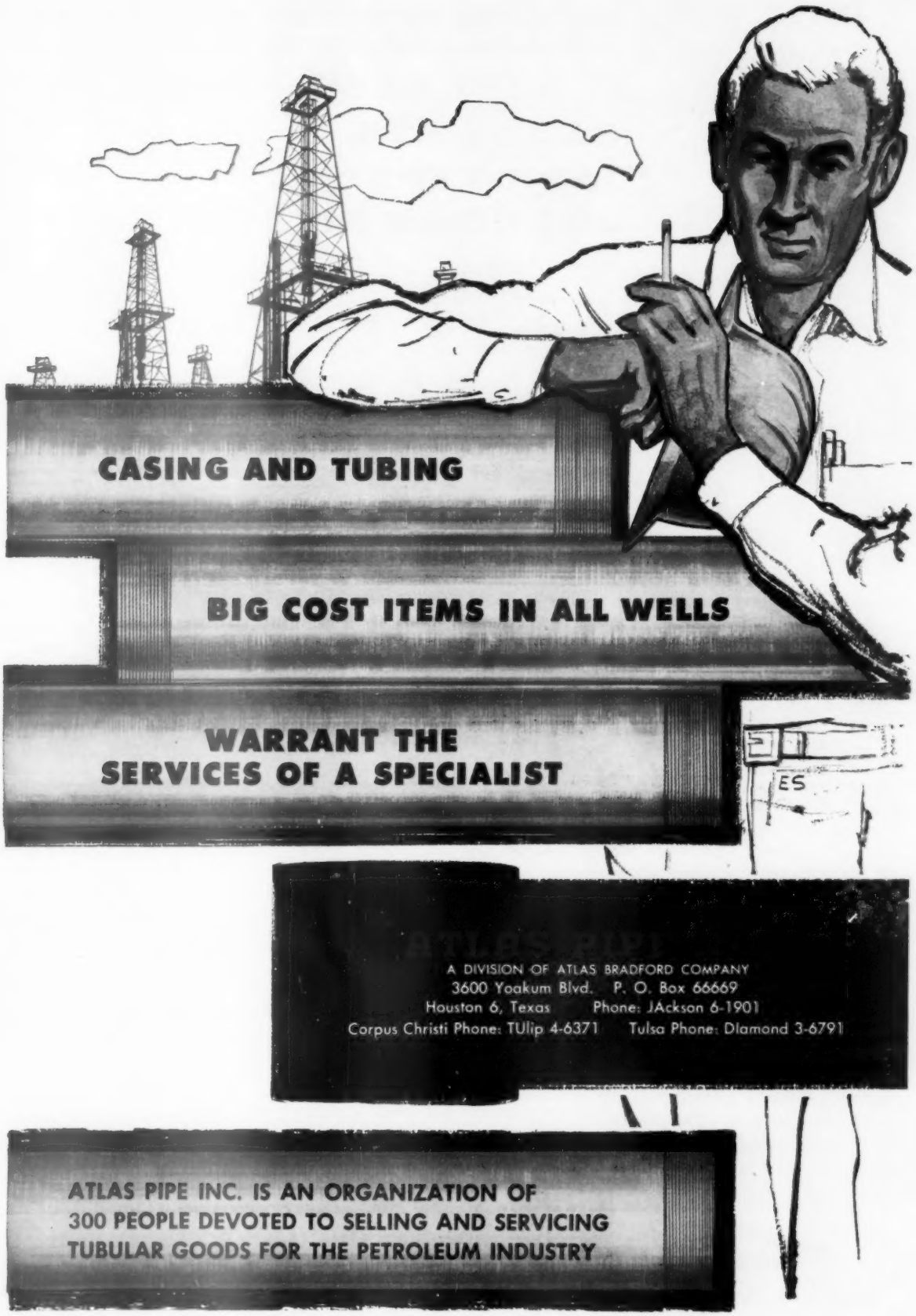
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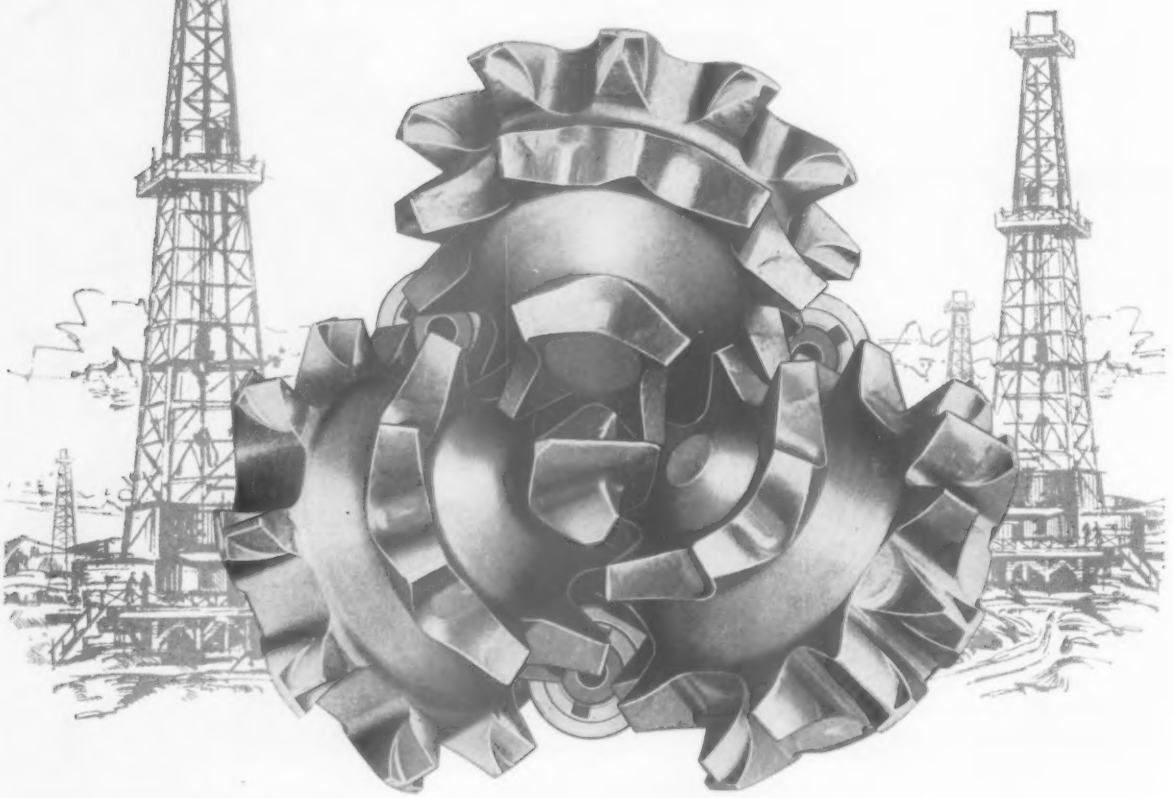
DRILLING and STRAIGHTER HOLES

IT'S THE NEW

GLOBE ST3 "TASK-TYPE" JET ROCK BIT



Speeds penetration rate by drilling harder formations with a coarser tooth than normally used.

Maintains a straight hole when going through hard streaks interspersed with soft formation.

All Globe 3-Cutter "Task-Type" Rock Bits are available in both regular and jet types.

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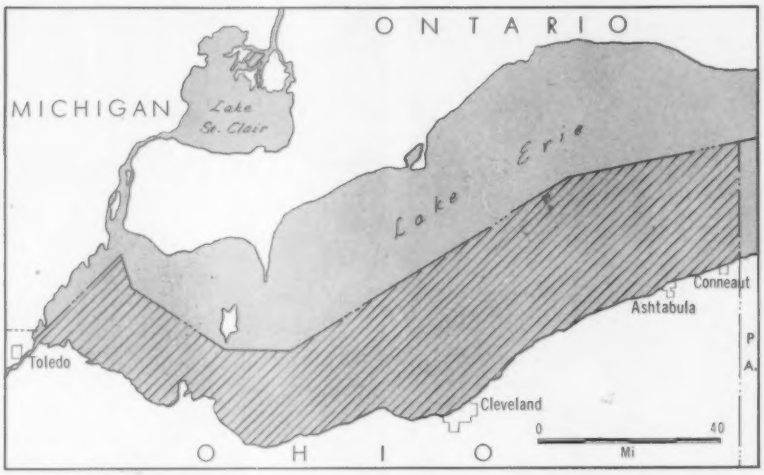
Branches maintained in all principal drilling areas



SHADED PORTION of map is the 3,654 sq. miles in Lake Erie that Ohio controls. Certain tracts will soon be offered for bid.

New drilling arena to open in Ohio's offshore Lake Erie

A VAST NEW AREA will soon be open for drilling according to a recent announcement by Ohio state officers. The new drilling arena will be in offshore Lake Erie.

The release spells out the regulations by which state offshore lands can be leased for drilling. Through its Division of Shore Erosion, the State of Ohio will periodically announce tracts that are open for competitive bid. This office will also regulate both bidding and drilling operations. Here's what's involved: Approximately 3,654 sq. miles, or more than 2,338,000 acres, are at stake. The total area is divided into units which are 0° 1′ 30″ of longitude wide and 0° 1′ 30″ of latitude high forming a rectangle which is roughly 1¼ miles wide and 1¾ miles high. The area in each regular unit is 2.21 sq. miles, or 1,414 acres each.

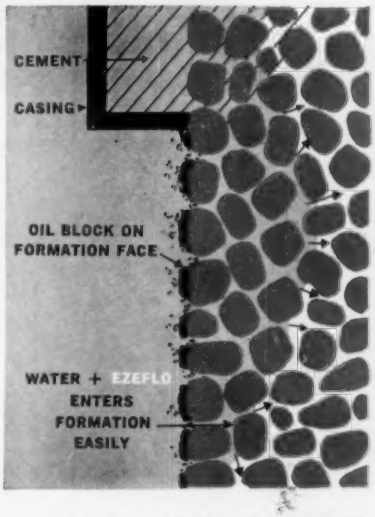
All tracts will be offered by competitive sealed bids. None are open for bidding yet.

In the offering of tracts open for bid, interested parties should write for a copy of rules entitled "Operating Procedure for Leasing Areas and Producing Gas and Oil in Lake Erie." Accompanying these instructions is a grid map of Lake Erie. So that certain tracts can be put up, or considered, for bid, the ODSE requests that persons interested in specific tracts or blocks return the grid map with lease nominations clearly marked. It is significant to note that one reason for doing this is the division of the offshore region into east and west sectors, which results in certain tracts having the same designation unless the suffix "east" or "west" is included. For example: GG-17-west and GG-17-east are more than 40 miles apart.

How to bid. Following announcement of the tracts open for bid (these will be published 30 days beforehand) sealed bids are to be submitted to Ohio Division of Shore Erosion, Department of Natural Resources. Bids should be accompanied by a certified or cashier's check in the amount of one-fifth of the cash bonus bid. Bids of less than $1 per acre will not be considered and separate bids and separate checks should be submitted for separate lease areas. The sealed bids will be opened publicly and the award will be made to the highest bidder. Unsuccessful bidders will have their checks returned within 15 days after bids are opened.

An alternate lease award, in lieu of bonus bids, may be requested by

new agent to lower water injection pressures



A new agent has been developed by Dowell to lower water injection pressures required to pump fluids into disposal or secondary recovery injection wells. The new chemical agent, called Ezeflo*, is a low-pour-point, water-soluble, nonionic surfactant. Ezeflo lowers the surface tension of water and the interfacial tension between water and oil. It also acts as a detergent for removing oil particles blocking water injection; thus reducing the pressure required for a given rate of flow. A major advantage of Ezeflo is its ease of handling. Ezeflo dissolves in water much more readily than many similar products. This assures good distribution and increases the efficiency of the solution. The low pour-point of Ezeflo (—33°F) makes the product usable in cold climates. Ezeflo is packaged 50 gallons to the drum and is available from any Dowell station.

*DOWELL TRADEMARK

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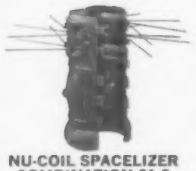

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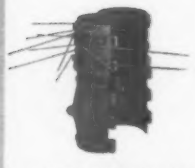

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the department in which a percentage royalty is to be paid over the term of a lease. Percentage of royalty should be expressed in four decimal places (i.e. 14.0625%) and this will be paid on the market value of any gas and oil produced during the life of the lease. Bids offering less than 12.5000% royalty will not be considered.

Length of leases. Leases shall be executed to run for a period of 5 years and from year to year thereafter as long as gas or petroleum products are or can be produced in paying quantities.

The leases apply only to mineral rights pertaining to petroleum. Sand, gravel, and all other mineral rights will be retained by the state.

A bond is required of the successful bidders. Before issuance of a lease, the lessee must post a surety bond for the term of the lease and 6 months thereafter, in the sum of $25,000 conditioned on compliance with all terms of the lease. An alternative is to post a bond for the amount of $100,000 covering compliance with all leases held on Lake Erie, in the event there are several.

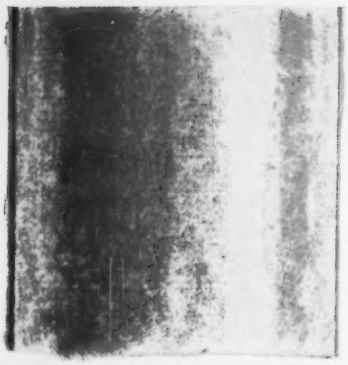
Leases, in whole or in part, can be transferred or assigned only with the written consent of the Chief of the Division of Shore Erosion, the Director of Natural Resources, and the Natural Resources Commission.

No leases will be drilled within 1 mile of shore, within 500 ft. of the boundaries of a lease, nor within 1,000 ft. of a recognized navigational course shown on official charts published by the U. S. Lake Survey.

Other considerations mentioned in the procedures include: requirements of successful bidder, length of lease (usually 5 years, unless producing), bond (surety) required, transfer of leases, drilling and producing rules, and all other pertinent information regarding leasing and operating rules.

For further information it is suggested that the reader write: John R. Hyland, Chief, Ohio Division of Shore Erosion, 1101 Ohio Departments Building, Columbus 15.

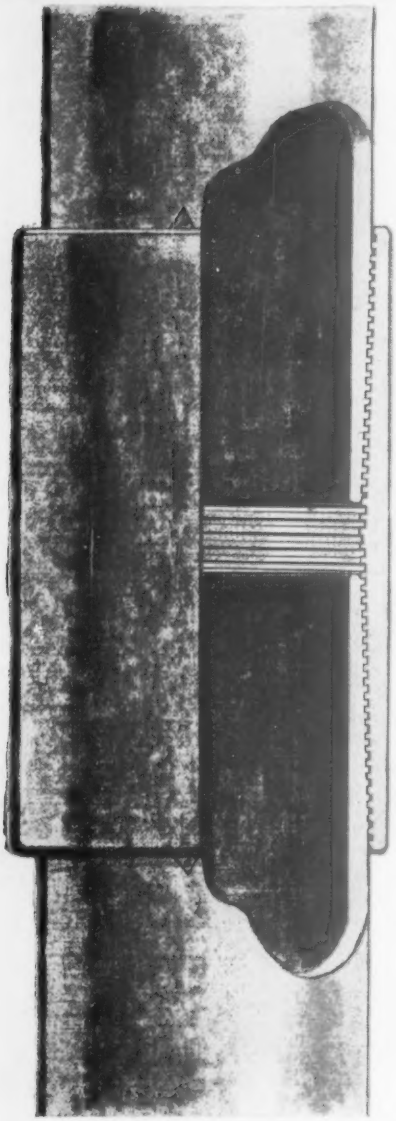
It's been a long time coming, but now Ohio affords a new working area for drillers. It's likely that production on land in Ohio and Ontario will sweep across Lake Erie.



NEW!

For More Confidence In Casing Deep Wells

Pittsburgh Seamless Buttress Thread Casing



For safer, more economical completion of deep wells, you need casing with the best metallurgical qualities and strong joint design. You have it now from a new source in Pittsburgh Seamless Buttress Thread Casing.

Buttress Thread, a product of one of the country's pioneer seamless producers, will support the weight of longer casing strings. Here's why:

- Special open hearth furnace heats, made by skilled steel men with 55 years' experience, provide steel with the tremendous yield strength required.
- The small thread flank angle—three degrees—virtually eliminates hoop stress caused by tension.
- Coupling threads engage the casing threads throughout their entire length. The ¾-inch taper per foot is continuous. Fast angle vanishing threads are eliminated, so the full section of the casing supports string weight.
- Five threads per inch and the thread design promote easy stabbing and rapid spinning to reach a power-tight position.
- Inside clearance is the same throughout the string. There is no internal upset to reduce inside clearance.

For these reasons, Pittsburgh Steel Buttress Thread Casing is the best bet for your next deep well. For descriptive literature and more information, write:

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The Straker Supply Company
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Superior Iron Works & Supply Co.
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Tex-Tube, Inc.
Houston 7, Texas

Western Supply Company
Tulsa 1, Oklahoma

Pittsburgh Steel Company
GRANT BUILDING • PITTSBURGH 30, PA.

GAGE LUND, vice president of Standard Oil Co. of California, and API vice president for production told his Tulsa API hearers last week that there's . . .

TROUBLE AHEAD

in the shape of an earth-scientist shortage

THERE HAS BEEN A dramatic drop in college enrollment in the earth sciences and it presages a shortage of geologists and geophysicists that is "almost certain in the next year or two," the API speaker said. He included geological and petroleum engineers as well.

"Just how long the shortage in earth scientists will last after it sets in, we don't know," Lund said. "Certainly it will last until the classes . . . start coming up to normal size again. But we have no assurance that this is going to happen automatically." According to this speaker, total enrollment in geology and geophysics was down by nearly 13% last year, and freshmen enrollment declined nearly 37%. In petroleum engineering, the number of graduates has declined from about 700 per year in 1957-1959 to an estimated 400 in 1962-63.

Besides declining enrollment, Lund pointed to a second major sign of trouble ahead—the gradual drift of earth-science students into related fields, as they see the oil industry lopping off exploration heads. "A growing number of geology or geophysics students are finding that by shifting their emphasis, they can graduate with degrees in straight physics or math, and find the industry recruiters waiting for them with open arms."

Yet a third danger, Lund warned, is the lure of the "glamor" industries—aircraft, missiles, electronics, computers—not only for students but for presently employed earth scientists. "The trend," he said, "is away from the earth sciences—which find their application in the oil industry—and to the disciplines that find more ready application in the glamor enterprises of the space age . . . We can take a certain amount of wry pride in the fact that our earth scientists are very bright, very well educated, very versatile people. They take only a minimum of additional training or experience to make very able scientists in other fields. And this is just what is happening to us."

What's the remedy? Lund had a few suggestions.

First, the oil industry must recognize the seriousness of the problem. "The pendulum is swinging back," he said, "as it has before, and earth scientists will again be needed in force as the tempo of exploration and production steps up again."

Having recognized the problem, the second thing to do is to attack the trouble at its roots. And those roots lie in the general public's opinion of the oil business. It must be reassured that ours is not a dying industry, but one with an exceedingly bright future.

"This is the message we have to disseminate by every means available to us," Lund declared, ". . . through advertising, through. . . public relations, and in our relations with the schools, through our personal contacts."

College students must be convinced once again, after having lost their faith in oil in recent years, that earth sciences still have a lot to offer.

At the same time, Lund said, the oil business will be wise to do something about holding on to the people it now has. "Those of us who employ earth scientists must find ways to smooth out our industry's hiring cycle. The day when we could hire and fire at will, to meet the short-term staff needs of the moment, is largely over. If we don't provide our earth scientists a reasonable degree of job security . . . we can be certain that they won't be standing around, hat in hand, waiting to be called when we need them again, as we surely will."

Urges Head-On Attack

Lastly, Lund suggested, the oil industry must meet the proselyting problem head-on. "Few of us can engage in an all-out salary-bidding war with competitors in the labor market who come to the auction armed with lucrative government contracts. But we are not totally helpless. Most of our companies have exceptional benefits plans which afford above-average security to an employe. All of us offer employment in a stimulating business with rich rewards of the mind and the heart . . . I don't think we want people whose only concern is with security. Our business wasn't built by such people, but by men who were willing to take a risk."

Gage Lund has put the industry on notice. His warning comes at a time when wholesale firings of geologists and geophysicists seem to have waned. From this point, employment in the oil-finding professions can go in only one direction, and that is **up.**

Oil comes East Texas

"BETHANY NORTHEAST promises to be an important addition to oil reserves for years to come." . . . That final statement in a short article called "A New East Texas Oil Patch" in the October 1957 issue of United Gas Log now bears all the earmarks of prophecy in the process of fulfillment.

Union Producing Co., then as now the major operator in the field in Panola County near the Texas-Louisiana state line, had at that time 35 wells and an interest in several others. One of these, the A-1 Furrh unit, was dually completed and became the company's first dual pumper.

As the tally now stands, UPC has 55 wells—including two triple completions — and an interest in 15 others of the field's total 132. Cumulative production in the field to January 1, 1961, was just under 2,000,000 bbl. with UPC-operated wells alone accounting for more than 1,100,000 bbl.

Gas—Then Oil

During the drilling in 1956 of a gas-development well near Bethany, in an area where natural-gas production has been common since the early 1920's, UPC's 1 Jordan unit projected for an 8,500-ft. depth, drilled through the Mooringsport lime just below 3,800 ft. Nearest Mooringsport production at the time was several miles away, but cores indicated potentially good oil-producing possibilities.

Although 1 Jordan unit drilled ahead to be completed as a dual gas well, the shallower zone was not forgotten. Shortly afterward another operator was encouraged, with a cash contribution by Union, to drill a test well to the Mooringsport formation. The result was successful, and Bethany Northeast oil field in

A VIEW OF UPC's A-2 Tiller well, now nearing completion in Bethany Northeast field.

to old gas field

Comparatively shallow pay and good production records mark Northeast Bethany as an important new oil reserve.

Courtesy United Gas Log, Shreveport.

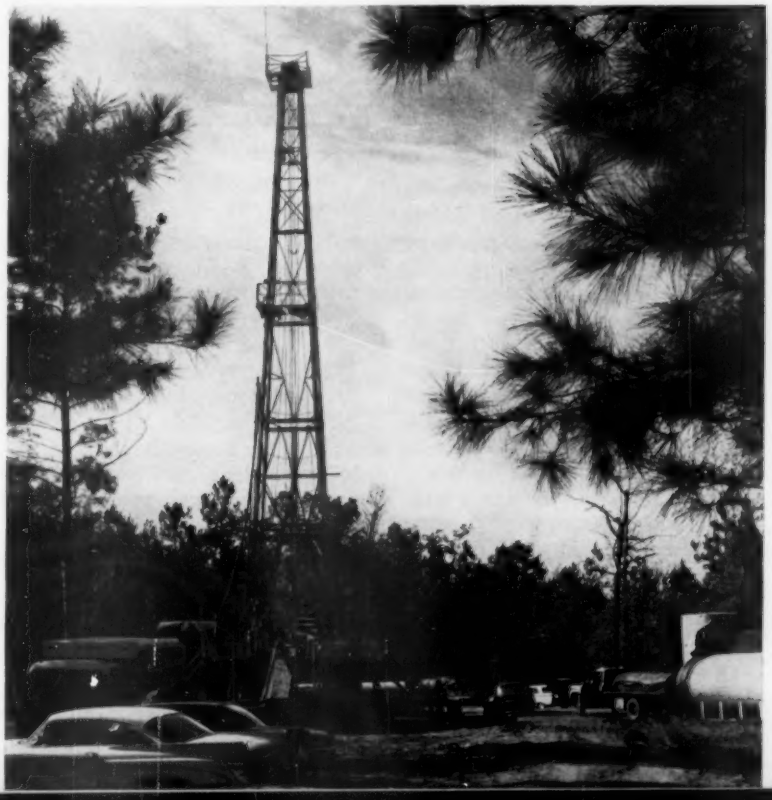
the Shreveport district was born. Union Producing completed its first oil well, the A-1 Jordan unit, late in 1956 near the 1 Jordan unit gas well.

In June 1957, UPC completed its first well in the Jenkins sand, discovered 2 months earlier by another operator; and at the end of 1957 had 34 singly completed Mooringsport wells and 1 well dually completed in the Jenkins sand and Mooringsport lime.

During 1958 and 1959, only nine wells were drilled in Bethany Northeast, none by Union Producing Co. But in January 1960, a third oil-producing formation, the Woolworth sand, was discovered in a western extension of the field. The discovery well, drilled by another operator, was completed as a dual Woolworth - Mooringsport well. Significantly, the Mooringsport well flowed 235 bbl. of oil per day, whereas other Mooringsport wells in the field were pumping at this time.

Union's first well in the new portion of the field was the A-1 Tiller, completed as a dual Woolworth and Mooringsport well on November 25, with the Mooringsport well flowing 191 bbl. of oil per day and the Woolworth pumping 45 bbl. Here UPC drilled eight wells. Six of these were dual completions and two, one of which becomes the company's first triple pumper, were triply completed in the Woolworth, Jenkins,

CLOSEUP of the 1 Tiller, showing two sets of rods for the pumpers. The third is a flowing well from the Mooringsport lime formation.



FIRST WELL in the new portion of Bethany Northeast field is UPC's 1-A Tiller.

" . . . one large unit to pump all three wells . . . is expected to result in immediate production-cost benefits."

and Mooringsport formations. Uniquely, the triple pumper is being produced by a single pumping unit with three sets of rods working off of one "horsehead."

Union Producing Co.'s triple pumper, the B-1 Furrh, could have been produced with installation of one, two, or three pumping units; but it was decided to adopt one large unit to pump all three wells. This arrangement, possibly a first for the oil industry, is expected to result in immediate production-cost benefits as well as somewhat of an advance in pumping-unit design.

Two rigs. Currently Union has two drilling rigs in operation in Bethany Northeast. One well is being completed as a dual; and the other, nearing the coring point, is drilling ahead. Two additional locations have been staked, and the company has other nearby acreage considered to hold favorable prospects. Other operators, also active at this time, have four wells drilling and have staked three additional locations.

Economically attractive are the comparatively shallow depths of the producing formations in Bethany Northeast field, which are, approximately: Jenkins sand—3,700 ft., Woolworth sand—3,720 ft., and Mooringsport lime—3,800 ft.

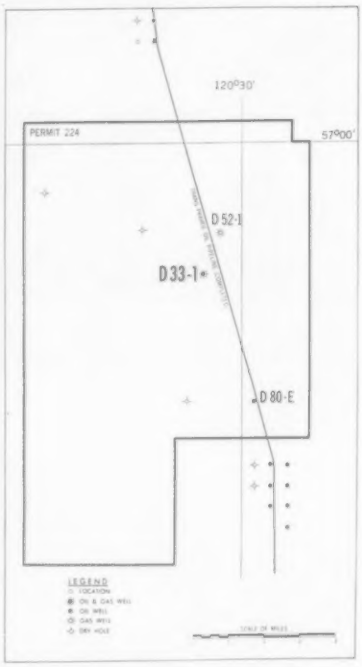
Dual oil and gas discovery in Peejay area of northeastern British Columbia

THE TEAM of Pacific Petroleums, Ltd., West Canadian Oil & Gas, and Scurry Rainbow Oils has reported an important oil and gas discovery in the Peejay area of northeastern British Columbia on properties of Canada Southern Petroleum, Ltd. The dual discovery establishes the region as an important gas and oil-producing area.

The discovery well, d-33-I Peejay, recovered natural gas at rates of approximately 3 M.M.c.f.d. from a 76-ft.-thick section of Triassic "A" zone encountered at a depth of 3,319 ft. At 3,717 ft., drill-stem tests of an Abrasijet notch made in the Triassic "D" zone flowed oil through a ½-in. choke at a rate of 13.4 bbl. per hour, or approximately 320 bbl. daily, with a tubing pressure of 85 psi. The thickness of the oil-bearing "D" zone is not yet known.

The new oil and gas discoveries are on Permit 224, which covers 53,755 acres acquired originally by Phillips Petroleum from Canada Southern under farmout arrangements and in which Canada Southern owns a 27.75% by carried interest. The balance of the interest is held 27.75% by Pacific (which firm recently acquired all Canadian interests of Phillips), 22.5% by West Canadian and 22% by Scurry Rainbow.

No. 4-33-I Peejay is 3¾ miles northwest of Phillips d-80-E Triassic Halfway oil discovery and 1½ miles southwest of Pacific d-52-I Peejay Triassic Halfway gas discovery.



BRITISH COLUMBIA'S Peejay area gained an important oil and gas discovery at Pacific Petroleum et al. d-33-I Peejay.

The Peejay area is now served by the recently completed Trans Prairie oil pipeline which delivers oil from the Peejay, Boundary Lake, Milligan Creek, and Beatton River areas to refineries at Taylor and Dawson Creek. The Trans Prairie pipeline also will serve as a part of the gathering system for the new Westcoast Transmission oil pipeline. The new Westcoast system, now under construction from Vancouver to northeastern British Columbia, is scheduled for completion this fall.

Oil and gas operators in the areas served by the Trans Prairie pipeline have begun work on a joint all-weather road, which will parallel the pipeline route. Present plans call for the road to be completed by midsummer, after which time drilling operations are expected to be conducted on an all-year basis.

Saskatchewan field may edge into U. S.

Canada's first international oil field may be shaping up at a newly opened pool in southeastern Saskatchewan.

Kissinger Petroleums, Ltd., et al. completed the South Carievale well, 3-4 on LSD 3, 4-1-31w1. Initial potential was 189 bbl. per day from an estimated 40 ft. of net pay in the Mississippian Frobisher beds at 3,994-4,004 ft. Location is 3½ miles southeast of Workman field. A followup across the border in North Dakota, Clyde G. Kissinger et al. 1 State of North Dakota in Lot 4, 28-164n-84w, has reached total depth and is being cased for production tests.

Canadian Lexicon of geologic names released

A lexicon of geologic names in the western Canada sedimentary basin and Arctic Archipelago has been made available by the Alberta Society of Petroleum Geologists.

March multiple completions

	Dual oil	Dual gas	Triple oil	Triple gas	Triple oil/gas	Dual oil/gas	Quad. oil	Quin. oil/gas	Dual gas/dist.
Arkansas	..	2	..	..	..	..	..	..	..
Kansas	4	..	..	..	1	1	..	..	..
Louisiana	27	3	4	2	3	1	..	..	..
North	1	..	..	1	1	..	..	..	..
South	20	3	4	1	1	1	..	..	..
Offshore	6	..	..	..	1	..	..	..	..
Mississippi	3	..	..	..	..	..	..	..	..
Montana	1	..	..	..	..	..	..	..	..
Nebraska	1	..	..	..	..	..	..	..	..
New Mexico	1	..	1	..	1	..	..	..	..
Oklahoma	35	6	5	..	..	7	..	..	..
Texas	48	20	5	1	3	6	3	2	6
South	18	10	4	1	3	5	3	2	..
Gulf Coast	7	4	..	..	..	..	..	..	6
East	8	2	..	..	..	..	..	..	..
North	4	1	1	..	..	..	..	..	..
West Central	1	..	..	..	..	..	..	..	..
West	8	..	..	..	..	..	..	..	..
Panhandle	2	3	..	..	..	1	..	..	..
Wyoming	1	..	..	..	..	1	..	..	..
Total U. S.	121	31	15	3	8	16	3	2	6

Total multiple completions, 205.

This book is available from John D. McAra, Ltd., Calgary.

The first lexicon of geologic names in Alberta, containing 196 names of recognized stratigraphic units, was published in 1954. The present lexicon, containing 554 names, extends the coverage to the entire area of western and northern Canada. This new addition to geologic libraries will be a valuable tool to those interested in western Canada.

Another dry hole off California's Santa Barbara

Shell Oil Co. has revealed the first well the company drilled in California's tidelands has been abandoned as a dry hole.

The 1 Refugio was drilled to 10,000 ft. before being plugged. The dry hole is about 2½ miles off Santa Barbara County on the seaward half of Parcel B. Shell farmed out the acreage from Standard Oil Co. of California and Humble Oil & Refining Co.

The Shell well was drilled in 230 ft. of water by Global Marine Exploration Co. The contractor drilled the well from its drilling ship, CUSS I, which now is on location off Baja California drilling test wells for the Mohole project (OGJ, Mar. 27, p. 72).

The 1 Refugio is one of 35 wells drilled off Santa Barbara, but is only the third classified as a dry hole. Three discoveries and one indicated discovery have been made in this tidelands areas and most of the remaining wells have been drilled and suspended (OGJ, Mar. 13, p. 95).

Big California well to be offset

Trico Oil & Gas Co. has staked location for the 1 Vlach unit ½ mile northeast of McCulloch Oil Corp.'s 1 Duarte, which has been tagged the biggest gas well in the Sacramento Valley.

The 1 Vlach unit will be drilled in 8-2n-1w in the Los Medanos area of Contra Costa County. It will be a 5,000-ft. test aimed at the Domengine sands, which produced the big flow in the McCulloch well.

The 1 Duarte had an open-flow potential estimated at 170 M.M.c.f.d. from two thick sections of the Domengine. The top section includes 252 ft. of pay between 3,890-4,142 ft. and the lower 85 ft. between 4,150 - 4,235 ft. The Trico well will be the first drilled in Los Medanos since the 1 Duarte in December.

Gas flow increases at southwestern Kansas strike

Increased gas output is reported at a Stanton County wildcat discovery in southwestern Kansas. Discovery well is Pan American Petroleum Corp. 1 Nicholas Gas Unit "C" in C NE SW 15-30s-39w.

The well flowed 9,240 M.c.f.d. from perforations in the Morrow Pennsylvanian at 5,630-34 ft. Previously it flowed 2,530 M.c.f.d. Two new field wells in the area include 1 Brown Gas Unit "E," C SW NE 16-30s-39w and 1 Nicholas Gas Unit "D," C NE SW 14-30s-39w. This new unnamed field lies 10 miles southeast of Johnson, Kans.

Clark County. Graham-Michaelis Drilling Co. 1-8 Wilson, C SW NE 8-33s-21w, confirmation well to Northeast Sitka field, flowed 3,245 M.c.f.d. from Morrow sand perforations at 5,298-5,324 ft. This field was opened last December at 1-5 Wilson in C SE NW 5-33s-21w, 7½ miles east of Ashland, Kans. It flowed 7,400 M.c.f.d. during open-flow tests.

Gas pay tapped in Clark County by Kansas wildcat

In Kansas, Sunray Mid-Continent Oil Co. has tapped gas production at an exploratory well in the Harper Ranch field area in Clark County.

Nearest field production is 2½ miles south in Snake Creek pool. The 1-A Melville Harper, SE NW SE 18 - 34s - 21w, flowed 1,100 M.c.f.d. from Morrow perforations at 5,374-90 ft. The hole was drilled to 5,492 ft. with 4½-in. casing cemented at 5,489 ft.

Muddy roads idle new Michigan find

In southeastern Michigan E. Edwin Brehm 1 Dziedzic, SE SE NW 12-4n-15e, Casco Township, St. Clair County, a wildcat northeast of the Peters gas-oil Niagaran pay field, showed 600 ft. oil in 10 hours from Niagaran at 2,700 ft. and was idled due to muddy lease roads.

Panhandle Eastern Pipe Line Co. 1 Sharrow, C SE NE 10-3n-16e Cottrellville Township, St. Clair County, cored gas-oil section in the Niagaran at 2,101-36 ft. to renew interest in the Marine City area, first discovered in 1955.

Old Kentucky wells revived

In the old Berea (Mississippian) sandstone producing area of eastern Lawrence County, eastern Kentucky, notch fracturing has apparently been successful in stimulating old producers. Petroleum Promotions, Inc., has fractured 2 Martha Ball, 3,250 ft. from north line and 3,050 ft. from south line 1-T-82 and is reported pumping 25 bbl. of oil daily. Berea was logged 1,569 ft. to 1,628 ft. with total depth being 1,633 ft. Testing continues.

In Central Kentucky's Washington County, an active wildcat is Hammond 1 Derranger, 5,075 ft. from north line and 18,250 ft. from east line 7-Q-54 drills below 900 ft. Top of Wells Creek was reported at 868 ft. This county has never had commercial production nor much wildcatting, so much interest is focused in this present test.

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3. Reduction of time required for bottom-hole cleanup after fracturing job.
4. Elimination of abrasion by propping agent on bottom-hole and surface equipment if "flow-back" occurs.
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Tule Creek gets fifth hit

Montana's Tule Creek field will have its fifth producer at Humble Oil & Refining Co. 1 McKee, C NW SE 13-30n-47e, Roosevelt County, will be completed in Nisku Devonian. This well, an offset to Devonian production in the field, went to 9,075 ft., and was then plugged back to 7,850 ft. Oil flowed on drill-stem tests of the Nisku at 7,631-45 and 7,568-81 ft. Humble and Phillips will drill 2 McKee in C SE NE 13-30n-47e as a northeast extension to the 1 McKee, slated to the Nisku.

Nebraska's Pierce Lake adds oil producer

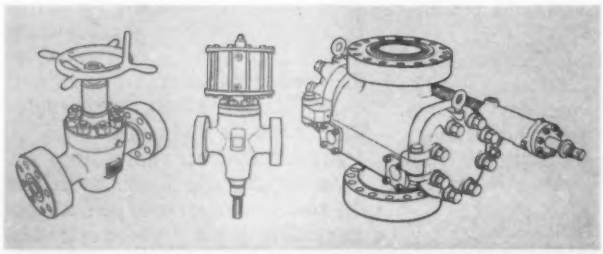
In Nebraska, Sunray Mid-Continent Oil Co. has completed the 1 Ralph E. Stroup "A," C SW NE 8-2n-37w, as an oiler in Pierce Lake field of Dundy County.

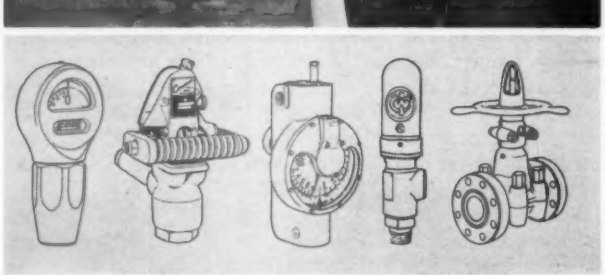
Final tests gaged 53 bbl. of oil a day on the pump from Kansas City lime perforations at 4,166-76 ft., 4,250-66 ft. and 4,328-31 ft. Total depth was 5,024 ft. with 4½-in. casing cemented at 4,468 ft.

West offset to new Abo reef discovery flows oil

The west offset to a newly opened Abo reef discovery in southwestern Lea County, Southeast New Mexico, 10 miles southwest of Lovington, flowed oil at the rate of 60 bbl. in 2½ hours.

Well is Cities Service Petroleum Co. 1-BJ State, 35-17s-35e. Drill-stem test was at 8,779-8,846 ft. The discovery of this field, Amerada Petroleum Corp. 1-VC State, completed last January, flowed 741 bbl. of oil per day on 20/64-in. choke from perforations at 8,890-8,930 ft. That well is in Section 36.





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Good gasser added to Wayne, Ohio, pool

In Ohio, Ohio Fuel Gas Co. has added another good gasser to the pool in northwest Plain Township, Wayne County, Natural gage of 1 A. L. Becker, Section 5, was 618 M.c.f.d. and after fracture 2,460 M.c.f.d. with a rock of 980 psi. The Clinton sand was logged at 3,174-85 ft.

Ohio well taps Clinton gas pay

In Ohio's Howard Township, Knox County, Leland Shorts reported completion of the 1 F. Cochran, 4th Qt., as a Clinton gasser with an initial flow of 1,860 M.c.f.d. and rock pressure of 850 psi.

This well is a cleanout of a test drilled in 1925 that had a showing of oil at 4,810 ft. Shorts treated the Cambro-Ordovician at 4,790-94 ft. and 4,802-7 ft. Production after acidizing was 1 bbl. of oil per day and rock pressure in 48 hours, 650 psi. Hole was then filled back to fracture the Clinton sand from 2,686-2,738 ft.

Delta Drilling Co. is moving in on a granite test to be made in Adams Township, Muskingum County, on 1 W. R. Marshall, Section 15. Participating in this test are Sun Oil Co., Shell Oil Co., and River Gas Co.

North Texas gets first quadruple completion

THE FIRST quadruple completion in North Texas is reported at Christie, Mitchell, & Mitchell 1 Methodist Camp, 4 miles southwest of Chico in northwestern Wise County.

This well flowed 971 M.c.f.d. plus 8 bbl. condensate per day from Morris sand perforations at 4,005-28 ft. through 18/64-in. choke. From T-1 well at 4,274-95 ft. the well made 406 M.c.f.d. plus 3 bbl. condensate per day through ¼-in. choke. From Leftwick Atoka perforations at 5,272-76 ft. it flowed 1,118 M.c.f.d. plus 9 bbl. condensate per day through ¼-in. choke. From Morris 5,500-ft. Atoka zone at 5,462-66, 5,428-34 and 5,413-18 ft. the well flowed 143 bbl. of oil per day through 16/64-in. choke.

Young County. Gulf Oil Corp. completed a big Mississippian oil well in Young County, 3 miles northeast of Newcastle and 1 mile east of Mississippian field production at Regular.

The well, 1 T. J. Gardner, Section 425, TE&L Survey, A-632, flowed 819 bbl. per day through 24/64-in. choke from perforations at 4,708-15 and 4,719-42 ft.

Texas' Yeary field stretches north

In Texas, Pan American Petroleum Corp. has extended gas production some ¾ mile north in Yeary field of Kleberg County.

Pan Am's 1 State Tract 84 is shut in after completing in three zones for a total of 160 ft. of pay.

Drilled from an onshore location, the well is bottomed under the shallow waters of the Cayo del Grullo. Total sidetracked depth is 10,108 ft., plugged back to 10,093 ft. The well's true vertical depth is 9,908 ft.

The three producing zones, with completion intervals and open-flow potentials, are: Starkey sand, 10,017-37 ft., 9,250 M.c.f.d.; Morgan sand, 9,112-32 ft., 10 M.M. c.f.d.; Stubs sand, 8,758-68 ft., 60 M.M.c.f.d. Tubing pressure closed varies from 3,040 psi. in the Starkey to 3,650 psi. in the Stubs.

The well is bottomed 279 ft. north and 1,389 ft. east of the surface location.

New Rocky Mountain review book released

Over-all Rocky Mountain drilling was not so high in 1960 as in the previous year, but exploration came much closer to keeping up. In the list of 1960 discoveries were several of sufficient importance to change the exploratory and over-all activity outlook of entire provinces in the Rockies. These points are brought out graphically and statistically in "Oil and Gas Operations Rocky Mountain Region, 1960 Resume," published by Petroleum Information Corp., 1640 Grant Street, Denver. The resume is available from that firm now.

Unique field trip slated for Montana

Approximately 100 geologists from all over the United States will travel through the Big Horn River Canyon in southern Montana in early June in a field trip sponsored by the Billings Geological Society.

The trip, from Kane, Wyo., to the Yellowtail dam site southwest of St. Xavier, Mont., is scheduled for June 8-10, and will be made in a flotilla of rubber rafts. Stops will be made at various points deep in the spectacular gorge to permit close inspection of the many scenic, historic, archeologic, and geologic features of the canyon, most of which will be under hundreds of feet of water after the completion of Yellowtail Dam, and interpretive discussions at each stop, led by experienced geologists, will add scientific interest to the trip.

Field trips are an annual event of the society, but never before in the United States has a field trip been conducted wholly on a river.

Field trip announced for May 12-13 in Mexico

The Corpus Christi Geological Society will hold its annual spring field conference on May 12 and 13. This trip will cover Upper Jurassic, Cretaceous, and Miocene sections extending from Laredo, Tex., to Monterrey and Reynosa, Mexico. For details contact John D. Myers, Phillips Petroleum Co., Box 1381, Corpus Christi.

Movie-lot test planned in California

A wildcat will be spudded soon on an 80-acre tract located about ¾ mile south of Culver City field, a one-well field on Metro-Goldwyn-Mayer's property in Los Angeles.

Trigood Oil Co. is rigging up to drill the new test, 1 MGM, in 7-2s-14w. The well will be whipstocked from a surface location on MGM lot No. 3.

Continental Oil Co. discovered Culver City about 2 years ago, but has been unable to come up with a second producer. The company has drilled three dry holes offsetting the discovery. The one Culver City well is producing about 130 bbl. daily.

Remote tests drilling in Kentucky counties

In Lincoln County, a deep test for the area is drilling at 1,400 ft. The well is on the Lee Tolbridge tract, being operated by Davidson & Diamond.

In extreme southeastern Kentucky, Graham - Michaelis Drilling Co. was reported below 3,200 ft. at 4 Robert Viall, 10,200 ft. from the east line, 1,255 ft. from the north line in 8-E-72. Elevation is 1,540 ft.

Illinois holds attention in tristate basin

In Saline County, Ray Bianucci set casing to test Aux Vases at 2,897-2,914 ft. at 1 M. D. Lamb unit in SW SE SW 9-8s-7e, ½ mile north of Eldorado. A drill - stem test at 2,888-2,918 ft. got gas to the surface in 5 minutes, spraying oil in 15 minutes.

In Christian County, 3 miles northwest of Edinburg, Atikins & Hale 1 Ricci-Rink Heirs in N½ SE NE 7-14n-3w, flowed 20 bbl. of oil per hour from Silurian at 1,713-49 ft. Location is ½ mile north of a small Silurian well completed in 1955.

In Jasper County, the McClosky at 2,936-46 ft. is a new pay for the area 1½ miles northwest of Ingraham. The well is Whaley Oil Co. 1 Willard O. Workman in NE SW SE 19-5n-8e. Recovery on a drill-stem test at 2,929-47 ft. was 1,080 ft. of oil, 1,300 ft. of salt water.

In White County, 3 miles west of Crossville, Slagter Producing Co. is pump testing at 1 Roy Stokes, SW NE SE 20-4s-10e. The well flowed 20 bbl. of oil per hour after fracture from Cypress at 2,834-48 ft. This well opens Cypress production in the area.

Geologists schedule Denver meeting

More than 4,000 geologists are expected to swarm into Denver April 24-27 for the combined AAPG-SEPM convention at the Denver Hilton Hotel. "Backbone of the Americas, Tectonic History from Pole to Pole" will be the general theme of the conclave. Laurence Brundall of Geophoto Services, Inc., is general chairman of the 1961 convention.

Utah's Lisbon field gains its best Ouray producer

A dual completion is the best Ouray Devonian well yet in Utah's Lisbon field. The Mississippian and Ouray producer is California Co. 21-15 Arnold in NE NW 15-30s-24e, San Juan County.

The well flowed 186 bbl. of oil per day through ½-in. choke from Ouray at 8,616-26 ft. and 4 bbl. of water per day. Gravity is 50°. From Mississippian at 8,403-8,566 ft. the well flowed 432 bbl. of condensate daily from 20/64-in. choke. The only other Ouray well in the field is Belco Petroleum Co. 2 Belco-State in C NE NE 16-30s-24e. It flowed 68 bbl. of oil daily through ½-in. tubing from perforations.

British Columbia may tighten oil regulations

IS THE BRITISH COLUMBIA Government going to get tough with its oil operators? The answer seems to be: "Yes."

This leaves the big question of just how tough, and only time will tell on this score. There have been several indications in the past number of months that petroleum firms can expect a general tightening of the regulations governing the exploration and development of oil and gas in British Columbia.

The Government has already signified that companies with crude-oil reserves will be given the opportunity of marketing these reserves within the province in the not-too-distant future and although it has not said as much it has been indicated that rapid development of potential producing areas is contemplated by the Crown.

Changes? Most recent indication of the pending change in government-oil industry relations was given petroleum and natural-gas rights on March 29, 1961. The Crown in a surprise move rejected bids on four out of the seven drilling reservations put up for sale, and also turned down purchase offers on several of the leases offered.

On the other side of the ledger, Government coffers were enriched by $1,526,604 from the accepted cash bonuses on the 26 parcels that were sold on March 29. Actual bonuses ranged from $235,578 for proved oil rights in the Peejay oilfield area. Top bidder at the sale, French Petroleum Co., spent $673 per acre for the Peejay lands, which cover just over half a section and are expected to yield two oil producers (based on 160-acre developments). Other major purchases at the recent sale were made by Union-Hudson's Bab-Richfield Oil development team at Beatton River; Provo Gas-Dome Petroleums at Nig Creek; the Northern Foothills Agreement Group (comprised of Texaco, Shell, Mobil, and British American) at Nig Creek; Sun-Fargo-General American-Western Natural Gas at Blueberry; and Sinclair Canada Oil at Boundary Lake.

It is expected that some pressure will be brought to bear to speed development work. With an approved oil-pipeline connection to Vancouver area refineries scheduled to be in operation later this year and with a declared ready market for about 60,000 bbl. of crude oil daily at the southern end of that line the Government's stand is obvious. It will collect royalty on all production and is thus most interested in this form of revenue at a much increased rate.

At the present with about 110 producible oil wells in the northeastern sector of the province there is producing potential of some 12,000 bbl. daily. Proved reserves are reportedly capable of supplying 25,000 bbl. per day—based on complete development — and to reach this production rate over 100 new wells will have to be drilled in the proved field areas. Exploration work is expected to yield new discoveries and development of these strikes will increase the potential producibility even further. To completely supply the market available (about 60,000 bbl. daily) will require something in excess of 500 wells, taking current wells as average producers. If this level of production is to be met and then attained within the next few years as is hoped by the Government authorities and pipeline firms, a substantially higher rate of devel-

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opment and exploration will have to be reached. Just how hard the Government can push the oil operators remains to be seen, but as mentioned earlier a harder push than previously exerted is anticipated.

Well confirms discovery in Oklahoma's Grady

An important confirmation discovery was reported in Grady County, southwestern Oklahoma. The well is Cleary Petroleum Inc. 2 Hilltop Unit in C NE 17-8n-5w, confirmation discovery to newly opened Northwest Blanchard field.

The well flowed 4,600 M.c.f.d. on 22/64-in. choke from Bromide Ordovician pay at 11,832-34 and 11,837-39 ft. Flowing tubing pressure was 2,850 psi. Shut-in tubing pressure was 3,850 psi. Openings at 11,812-19 ft. gave 4,500 M.c.f.d. after acid treatment. Condensate flowed at the rate of 80 bbl. per million. Pool opener was Cleary Petroleum et al. 1 Hilltop in C NE SW 16. It was completed last fall flowing 30,500 M.c.f.d. with 10 bbl. condensate from Bromide Ordovician at 11,715-11,810 ft. Gas outlet for the field is Mustang Fuel Corp. Pan American, Mobil, Continental, Eason, Howard Fleet, and W. B. Osborn, Jr. all have interest in the unit.

Discovery wells

TEXAS GULF COAST

Refugio County:

Texaco Inc. 1 K. D. Roche, W. H. Allen Sur., A-418, 6 miles southwest of Woodsboro. AOF 18 M.M.c.f.d., GRL 1,054 M.c.f. per bbl., 48.7°, shut-in TP 1,929 psi., perf. 5,076-84 ft., Frio. TD 6,862 ft. Discovery well of West Roche field.

WEST CENTRAL TEXAS

Brown County:

Leeco Gas & Oil Co. 1 Mrs. Jennie L. Connaway et al., 1 mile east of Brooksmith in J. B. Bealle Sur. 145. IPCAOF 2,200 M.c.f.d., Marble Falls open hole 1,112 ft. TD 1,178 ft. New gas discovery.

Callahan County:

Prorated in Regular field. Irvin Producing Co. et al. 1-F Ludie H. Owens, 8 miles south of Rowden in John P. Carson Sur. 189. IPF 83 BOPD plus 6% water, 12/64-in. choke, 40°, GOR 510:1, CP 410 psi., TP 200 psi., Cross Plains sand 1,766 ft. TD 2,260 ft. New oil discovery.

Coleman County:

Prorated in Regular field. Horace E. White et al. 2 Theo. M. Griffis, 6 miles southwest of Coleman in John H. Peoples Sur. 295. IPF 72 BOPD, 10/64-in. choke, 39.6°, GOR 1,400:1. CP 950 psi., TP 590 psi. TD 2,373 ft. New oil discovery. Strawn sand 2,338-42 ft.

Palo Pinto County:

South Highlands Development Co. 1 C. G. Peach Estate, 4½ miles west of Palo Pinto in Sec. 39, Blk. 2, T&P Sur. IPF 100 BOPD, 7/64-in. choke, 41°, GOR 1,710:1, CP 1,440 psi., TP 900 psi. Atoka conglomerate 2,519-24½ ft. TD 4,032 ft. New oil discovery.

Stephens County:

C. W. Gore 1 Laura G. H. Torrence, 14 miles northwest of Breckenridge in Sec. 663, TE&L Sur. IPF 642 BOPD, 15/64-in. choke, 43°, GOR 100:1, CP 1,250 psi., 890 psi., Miss. lime 4,486-91 ft. TD 4,493 ft. New oil discovery.

Texoma Production Co. 1 Whalen Estate, 7 miles northeast of Ivan in Sec. 1089, TE&L Sur. IPCAOF 17,700 M.c.f.d., Marble Falls 4,133-52 ft. TD 4,177 ft. New gas discovery.

Taylor County:

Fletcher Oil & Gas Drilling Corp. 1 G. S. Billingsley, 2½ miles east of Bradshaw in J. M. Swisher Sur. 457. IPF 115 BOPD, 16/64-in. choke, 41°, GOR 1,150:1, CP 220 psi., TP 180 psi., Gray sand open hole 4,357 ft. TD 4,359 ft. New oil discovery.

Prorated in Regular field. Hovgard & Fitzgerald 1 R. H. Armstrong heirs, 3 miles southeast of Tye in Sec. 34, Blk. 16, T&P Sur. IPP 54 BOPD, plus 28% water, 40°, GOR 225:1, Tannehill 2,102-4 ft. TD 2,800 ft. New oil discovery.

Tilton Oil Co. 1 Charles King estate, 4½ miles north of View in Subd. 29, Guadalupe CSL Sur. 121. IPP 32 BOPD, 40°, Tannehill sand 2,429-39 ft. TD 2,577 ft. New oil discovery.

Throckmorton County:

George R. Brown, Jr. 1 A. L. Whitaker, 3 miles northeast of Woodson in Sec. 956, TE&L Sur. IPCAOF 10 M.c.f.d., sand 1,226-42 ft. TD 1,300 ft. New gas discovery.

Trice Production Co. 1 Minnie Waggoner, 9 miles east of Throckmorton in Sec. 2348, TE&L Sur. A-700. IPP 101 BOPD, 42°, GOR 450:1, Miss. 4,680-90 and open hole at 4,700-12 ft. TD 4,712 ft. New oil discovery.

WEST TEXAS

Crane County:

Bell Petroleum Co. 1 Mobil-Glenn, 7 miles northeast of Imperial in Sec. 20, Blk. 1, H&TC Sur. IPP 103 BOPD, plus 12% water, 36.4°, Tubb 4,034-39 ft.; IPF 85 BOPD, 16/64-in. choke, 32.6°, GOR 600:1, 3,281-86 ft. TD 5,322 ft. Dual oil discovery.

Hill & Meeker and F. W. Holbrook, Inc., 2-23 Texas American Syndicate, 6 miles northwest of Imperial in Sec. 23, Blk. 4, H&TC Sur. IPF 162 BOPD, 24/64-in. choke, 38.2°, GOR 710:1, TP 250 psi., CP 700 psi. Devonian 5,770 ft. TD 5,850 ft. New oil discovery.

Hill & Meeker et al. 3-23 Texas American Syndicate, Sec. 23, Blk. 4, H&TC Sur. IPF 185 BOPD, 16/64-in. choke, 38.4°, GOR 960:1, TP 400 psi., CP 1,300 psi. Devonian 5,767 and 5,771 ft. TD 5,786 ft. New oil discovery.

Dawson County:

Forest Oil Corp. and Champlin Oil & Refining Co. 1 Durward Schmidt, 5 miles northwest of Lamesa in Sec. 3, Blk. 2, D. L. Cunningham Sur. IPF 216 BOPD, ¼-in. choke, 38.7°, GOR 230:1, TP 175 psi., packer, Wolfcamp 9,381-89 ft. TD 9,390 ft. New oil discovery.

WEST TEXAS

Fisher County:

Claytonville 5,000-ft. field, Fletcher Oil & Gas Drilling Corp. 1 J. H. Morris, 4½ miles northeast of Claytonville in Sec. 190, Blk. 3, H&TC Sur. IPF 104 BOPD, 20/64-in. choke, 42°, GOR 192:1, TP 140 psi., packer. Canyon sand 4,972-98 ft. TD 5,225 ft. New oil discovery.

Dugger & Herring et al. 1 Bessit Scott, 3 miles south of Sylvester in Sudb. 63, Bastrop CSL, Sur. 323. South Sylvester Flippen field. IPP 84 BOPD, 43.4°, GOR 390:1. Flippen lime 3,105-9 ft. New oil discovery.

Garza County:

Shell Oil Co. 1 W. M. Kirkpatrick, 4 miles southeast of Post in Sec. 3, Blk. 2, GH&H Sur. IPP 200 BOPD, 37.6°, GOR 165:1, Penn. 7,903 ft. et al. TD 8,531 ft. New oil discovery.

Pecos County:

Ashmun & Hilliard 3, Ltd. 1 Clara May Willie, ¾ mile southwest of Imperial in Sec. 13, Blk. 3, H&TC Sur. IPP 98 BOPD, plus 10% water, 32.8°, GOR 860:1. Glorieta 3,094-97 and 3,103-9 ft. TD 3,497 ft. New oil discovery.

Southern Minerals Corp. and General Crude Oil Co. et al. 1-A Jasper CSL, 30 miles southeast of Fort Stockton in Sec. 1, Blk. 104, Jasper CSL Sur. IPCAOF 12,300 M.c.f.d. Ellenburger 10,399 ft. open hole. TD 10,575 ft. New gas discovery.

Reeves County:

Tom Brown Drilling Co. et al. 1 J. B. Young et al., 20 miles southeast of Pecos in Sec. 6, Blk. 50, T-8, T&P Sur. IPF 160 BOPD, plus 35% water, 20/64-in. choke, 39°, GOR 1,906:1, TP 1,175 psi., CP 1,420 psi. Delaware 5,161-70 ft. TD 5,452 ft. New oil discovery.

Scurry County:

D. M. Cogdell et al. 1 H&W Winston, 1 mile south of Snyder in Sec. 183, Blk. 3, H&GN Sur. IPF 201 BOPD, 16/64-in. choke, 45.3°, GOR 553:1, TP 135 psi., Canyon reef open hole at 6,864 ft. TD 6,960 ft. New oil discovery.

Winkler County:

U. S. Smelting, Refining, & Mining Co. 1 W. S. Jasper, 5 miles southeast of Kermit in Sec. 15, Blk. B-6, PSL Sur. IPF 235 BOPD, 14/64-in. choke, 32.2°, GOR 508:1, TP 475 psi., packer, Devonian 9,612-52 ft.; IPF 318 BOPD, 14/64-in. choke, 47.8°, GOR 2,830:1, TP 1,520 psi., packer. TD 11,859 ft. Dual oil discovery.

CALIFORNIA

Kern County:

Standard Oil Co. of California 4-2 Well, NE NW NW 17-30s-22e. Flowed 410 M.c.f.d. through ⅜-in. choke from Tulare sands through perforations at 880-900 ft. and 910-20 ft. with flowing pressure of 150 psi. TD 1,300 ft. New pool discovery in Northeast McKittrick gas area.

WESTERN CANADA

Saskatchewan:

B. A. et al. 15-3 Robinson, LSD 15, 3-5-21w3. Shaunavon oil discovery. TD 4,622 ft. Central Del Rio Mows 2-36 Frys, LSD 2, 36-7-31w1. Mississippian oil discovery. TD 3,220 ft.

Alberta:

Sun 14-22 Trouch, LSD 14, 22-33-23w4. Basal Quartz oil discovery. TD 7,933 ft.

Mobil PR 12-36 West Judy, LSD 12, 36-62-12w5. TD 9,100 ft. Beaverhill Lake oil discovery.

Amerada Pacific 11-17 Fort St. John, LSD 11, 17-83-19w6. Permo-Penn gas discovery. TD 6,624 ft.

B. A. 4-13 Lookout Butte, LSD 4, 13-2-29w4. Mississippian gas discovery. TD 12,212 ft.

Cansalt 11-7 Lindbergh, LSD 11, 7-58-5w5. Colony gas discovery. TD 1,800 ft.

Champlin Apco 6-10 Sy Lake, LSD 6, 10-37-w35. Pekisko gas discovery. TD 7,669 ft.

B. A. CPR Murto 10-17 Sy Lake, LSD 10, 17-39-2w5. Banff sand gas discovery. TD 7,150 ft.

Canadian Superior et al. 10-13 Wilson Creek, LSD 10, 13-44-5w5. Miss. gas. TD 7,224 ft.

Apco-Champlin 10-11 Greencourt, LSD 10, 11-59-9w5. Pekiso gas discovery. TD 4,980 ft.

Clinton County:

Stortzum and Britton 1 Swagler, NW SW NW 10-2n-1w. IP 12 BOPD, 8 BWPD, Benois 1,445-52 ft. TD 1,457 ft. Opens North Shattuc field.

Marion County:

Consolidated Oil Co. 1 Kirtzinger, NW SE NW 2-2n-4e. IP 15 BOPD, 25 BWPD, Aux Vases 2,564-78 ft. TD 2,729 ft.

KANSAS

Grant County:

Pan American Petroleum Corp. 1 Vinegar, GU "B," C NE SW 7-28s-38w. IPF 7,775 M.c.f.d., 2,807-9, 2,764-66, 2,664-66 ft. TD 6,000 ft.

Haskell County:

Hamilton Brothers Inc. 1-15 Mattie E. Henry, C SE¼ 15-28s-31w. IPF 278 M.c.f.d., shut-in gas discovery. Krider 2,773-77 ft., upper Krider 2,746-56 ft. TD 2,786 ft.

Clark County:

Graham-Michaelis Drilling Co. and Phillips Petroleum Co. 1-5 Wilson unit, C SE NW 5-33s-21w. IPF 7,400 M.c.f.d., 37 BCPD, Chester 5,252-76 ft. TD 5,453 ft. Opens Northeast Sitka field.

Morton County:

Cities Service Petroleum Co. 1 Gore "C," C SE NW 9-35s-41w. IPF 3,200 M.c.f.d., Topeka 3,205-60 ft. TD 5,515 ft.

NORTH LOUISIANA

DeSoto Parish:

Stateswide Oil Corp. 1 Olin, NW SE SW 19-11n-14w, 1½ miles northeast of Hunter. IP 2 BOPD (net), 2% b.s. and w., ¼-in., 38°, perf. 1,324-34 ft., Nacatoch. TD 3,102 ft. New-field discovery.

SOUTH LOUISIANA

Calcasieu Parish:

Pan American Petroleum Corp. 1 Alex Fitzhugh, 35-8s-10w, 3½ miles west of East Buhler field. IP 123 BOPD, 10/64-in., 33.3°, TP 500 psi., GOR 700 cu. ft. per bbl., perf. 8,582-90 ft. TD 9,331 ft. New-field discovery.

Lafourche Parish:

Robert Mosbacher 1 Leah M. Ledet, 98-15s-17e. IP 158.4 BOPD, 1,275 M.c.f.d., 6/64-in., 48°, TP 9,625 psi., perf. 14,106-12 ft. TD 14,861 ft. New pay in Melodia field.

MICHIGAN

St. Clair County:

C. W. Collin and M. F. Lanphar 1 Kaufman, SW SW SW 24-4n-15e, 1 mile east Peters pool. AFIP 70 BO. Elevation 625 rig floor, Traverse lime 596, A-1 Salina 2,486, Brown Niagara 2,594. TD 2,607 ft. New pool discovery.

NORTH DAKOTA

Williams County, Grenora area:

Hunt Oil Co. 1 Clifford Price, C SW NE 29-159n-103w. IPF 179 BOPD, 2% water, 16/64-in. choke, 33.9°, TP 250 psi., GOR 335:1. Madison 7,708-24 ft. TD 8,210 ft. Madison discovery, new field.

OKLAHOMA

Blaine County:

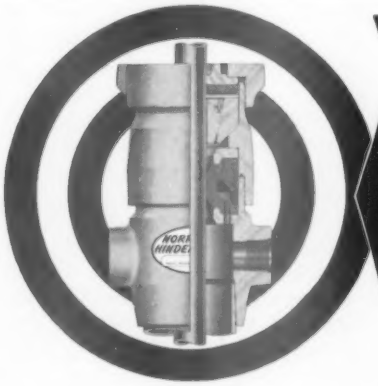
Texaco Inc. 1 Nettie Woodruff, C SW NE 4-15n-13w. IPF 7,021 M.c.f.d., Morrow 10,220-40 ft. TD 10,428 ft.

Cleveland County:

Herman Brown 1 Kunkler, SW SW SW 24-9n-1w. IPF 435 BOPD, 36°, Second Bromide 6,749-58; Oil Creek 7,419-30 ft. TD 7,497 ft.

Harper County:

Sinclair Oil & Gas Co. 1 Freda A. Yauk, C NE SW 22-28n-21w. IPF 7,592 M.c.f.d., Morrow 5,718-42 ft. TD 7,764 ft.



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WRITE FOR NEW WELL HEAD BULLETIN P. O. BOX 1739, TULSA

TUBING on CASING HEADS

Fuel Oil Can Hold Its Own

- **That's the conviction of Glenn Werly, who retired from Mobil to head the new National Oil Fuel Institute.**

GLENN L. WERLY doesn't expect to put the natural-gas industry out of business, but neither does the president of the new National Oil Fuel Institute expect gas to supplant fuel oil.

"If I thought fuel oil was fighting a losing battle, I wouldn't have taken this job," says Werly, who recently chose early retirement from Mobil Oil Co. in order to head the trade group.

"After 38 years I was ready to retire. I had every intention of resting and playing a little golf. But this was an interesting challenge."

The new president . . . Werly has been selling oil products, in one capacity or another, since he joined Mobil as a salesman in 1923 after receiving a BS from Cornell.

He left the company in 1936 and operated his own chain of independent retail service stations in Connecticut and New York for 4 years. After rejoining Mobil, he rose to general manager of marketing in 1956 and held that post until he became assistant to the vice president for marketing on January 1 of this year.

Glenn L. Werly
. . . realistic, but confident.

His experience has been largely keyed to retail merchandising and promotion at the service-station level.

For a man of 50 who was looking forward to a life of leisure, Werly is plowing into his new job with unusual relish.

Merger of the Oil Heat Institute and the National Fuel Oil Council won't be formally completed until about May 1, but Werly already is at work steering the "one-roof" association.

There is plenty of bustle at the old Oil Heat Institute office in New York which is serving as a temporary headquarters pending a move to another Manhattan location.

Werly is interrupted often by telephone calls which toss him the problems of a newborn organization, and he seems to welcome them.

The new organization . . . The merger will enable the fuel-oil industry to mount a unified drive in marketing, promotion, dealer education for improved service, and research to find better burners.

The new organization will be run by the full-time president, who is responsible to an executive committee.

Presidents of the two previous organizations were honorary employes with other full-time jobs.

"We should have a stronger organization as a result of bringing together the experience and talent that were divided in two groups," Werly says.

Organization goals . . . The top priority goal of the new association, in the view of its president, is this: Imparting to the industry a sense of urgency about the need to close ranks to meet the competitive challenge of other fuels.

▶▶▶ Personals

Frank I. Ingram, geologist for Atlantic Refining Co. in Guatemala and Bolivia, has been assigned to the Dallas office as geologist.

W. D. Mitchell, production foreman for Gulf Oil Corp., has been transferred to Victoria, Tex., from Durango, Colo.

Tom J. Williams, manager of operations for combined refineries of Leonard Refineries, Inc., has joined Commonwealth Oil Refining Co. as refinery manager. He will headquarter in Ponce, Puerto Rico.

George Edgerton, district supervising engineer for Humble Oil & Refining Co., has been transferred to Kingsville, Tex., from Greta, Tex.

W. E. Showalter and **Dr. Paul F. Helfrey** have been promoted to senior research engineers at Union Oil Co.'s Brea, Calif., research center.

W. L. Theisen, sales manager for Golden Eagle Refining Co., has been named vice president and sales manager.

Jim O'Neill, geological engineer with R. B. Montgomery Drilling, Inc., and **Fred Porter,** consultant, have opened consulting offices in Bakersfield, Calif.

John Van Fossan, Evansville, Ind., district geologist for Kewanee Oil Co., has been transferred to the new Lafayette, La., office. The Evansville office has been closed. **William J. A. Johnson,** district land man in Evansville, and **Albert H. Gillis,** geologist, have moved to Denver. **Charles D. (Dan) Bump,** geologist, has been transferred to Lafayette.

J. C. Wattie, manager of the Ontario marketing division of Texaco Canada, Ltd., in Toronto, has been named general manager of sales for the company. He will headquarter in Montreal.

John S. Russell, operations superintendent in Mobil Oil Co.'s Midland, Tex., division, has been named manager of production for the Los Angeles exploration and producing division. He succeeds **R. O. Swayze,** who will retire June 1 after 40 years with the company. **John O. Hills,** controller in the Los Angeles division, will succeed Russell in Midland.

The fuel-oil industry totaled over $3 billion in sales and services last year. It still has 41% of the home-heating market compared with 36% for natural gas.

But natural gas has fuel oil on the defensive in new-home installations, and it is growing much faster than fuel oil.

Forecasts call for growth rates of 4.5% for natural gas and only 1.3% for fuel oil during the next decade. By 1970, at these rates, natural gas will have surpassed heating oil in share of the market.

Werly recognizes that the advantages of natural gas—particularly the lower first cost of heating equipment, and its subsidy by distribution companies—offer a formidable threat.

"It would be unrealistic to state that the new organization will suddenly accomplish everything for everybody," he says. "It's achievement is going to continue to depend primarily on how much all the people in the industry working together put into its programs."

Still, he believes that heating-oil marketers have a lot to fall back on—a well-proved and economical method of heating, flexibility, and a price trend in their favor.

"My intention is to fight the battle on the basis of the merits of oil heat," Werly says. "Let others sell their product the same way, and I think we'll do all right."

Earle B. Barnes has been named general manager of Dow Chemical Co.'s Texas division. This post had been held by **Dr. A. P. Beutel,** vice president in charge of Gulf Coast operations. Barnes had been executive assistant to Beutel and Texas division director of organic research. **David L. Rooke** has been named assistant to the vice president, a new position.

W. B. Berwald, Shreveport, La., division manager for Ohio Oil Co., has been transferred to Tulsa as manager of an enlarged Tulsa division. His appointment is effective September 1. **J. S. Leonard,** manager of the present Tulsa division, will be transferred to Findlay, Ohio, January 1 to take over an executive assignment in domestic production headquarters. Ohio's Tulsa and Shreveport divisions will be consolidated with expanded headquarters in Tulsa. The new division will include Oklahoma, Kansas, Missouri, Iowa, Arkansas, Alabama, Mississippi, North and South Carolina, Georgia, Florida, East Texas, and the Texas Panhandle. It will include all of Louisiana except for the Gulf Coast and offshore areas.

Alvin B. Dyes, supervisor of reservoir engineering with Atlantic Refining Co. in Dallas, has joined Geopetrole in Paris, France, as a consultant.

Robert H. Colley, former president and chairman of Atlantic Refining Co., will retire May 2 after 42 years with the company. Colley became president of Atlantic in 1937 and chairman in 1952. He retired as chairman in 1954, but continued as a director. **Dr. R. R. White,** vice president and general manager for research and development, will be nominated to succeed Colley on the board.

Hans G. Schleicher, manager of Monsanto Chemical Co.'s plastics division polyolefins pilot plant in Texas City, has been named general superintendent of production for Monsanto's Chocolate Bayou petrochemical complex, now under construction near Alvin, Tex. Also named to the Chocolate Bayou project are **R. William Rotzler,** superintendent of quality control at Texas City, who will be general superintendent of technical services, and **William S. Sevier,** manager of materials distribution and transportation in Springfield, Mass., who will be general superintendent of distribution. **John S. Putnam,** formerly on the staff of the plastics division assistant general manager in Texas City, will be superintendent of maintenance, Chocolate Bayou. **Verlin A. Lauher,** St. Louis, has been appointed group leader of systems studies in the Chocolate Bayou engineering department. Also named to the systems studies group are **Roy L. Grantom,** senior research chemist with Monsanto's Lion Oil division; **John S. Hearn,** Lion chemical engineer; **Jack D. Shurden,** Lion senior engineer; **Claude W. Smalling,** a process-engineering supervisor for Lion; and **Fred Applegath,** Lion research specialist.

▶▶▶ Personals

F. J. Stephens, a managing director of Shell Transport & Trading Co. since 1957, has been elected chairman. He will take over the post July 1 after retirement of **Lord Godber,** who has been a director since 1928, a managing director

STEPHENS

BARRAN

since 1935, and chairman since 1946. **H. Wilkinson,** a managing director of the Royal Dutch-Shell companies and a director of Shell Transport since 1949, has been appointed a managing director of Shell Transport. **D. H. Barran,** president of Asiatic Petroleum Corp. and Shell Caribbean Petroleum Co., New York, will succeed Stephens as a managing director of Shell Petroleum Co., Ltd., and a principal director of Bataafse Petroleum Mij., NV. Stephens will leave these assignments when he takes over as Shell Transport chairman. Barran has also been named a director of Shell Transport.

John H. Henderson, Jr., chief engineer of American Gilsonite Co., has been named manager of engineering and product development, a new position. He will continue to be in charge of engineering and construction projects.

Herbert M. Cooley, Bethlehem Steel Co.; **Fred V. Kluck,** Ohio Oil Co.; and **H. A. Nedom,** Amerada Petroleum Corp.; all of Tulsa, received citations for service at the Mid-Continent district meeting of API's Division of Production in Tulsa last week.

O. A. Melvin, Carboline Co., Houston, has been elected chairman of the Houston section of National Association of Corrosion Engineers. **Benton Russell,** Russell & Sharpe, Inc., is vice chairman, and **W. M. Koehler,** Humble Oil & Refining Co., is secretary-treasurer.

Personals

William C. Kaesche, executive vice president of Collier Carbon & Chemical Corp., has been elected president. He succeeds **Robert T. Collier,** who has been elected chairman. **Dudley Tower,** president of Union Oil Co., has been elected a director of Collier. He will fill the vacancy created on the board by retirement of **W. L. Stewart, Jr.,** former chairman. **Paul Foreman,** treasurer and assistant secretary of Collier, has been named secretary. He succeeds **Howard W. Wright,** who will continue as a director. **Jay Linderman** will succeed Foreman as treasurer. **Ray Farthing** will succeed Foreman as assistant secretary. Kaesche has been with Collier since 1952. He was vice president in charge of manufacturing operations before being elected executive vice president.

KAESCHE

A. M. L. Kube, assistant Panhandle district superintendent for Phillips Petroleum Co.'s natural-gasoline department in Borger, Tex., has been promoted to superintendent. He succeeds **A. W. Paris,** who retired April 1.

W. B. Hawke, assistant general manager of Texaco's foreign-operations department (Western Hemisphere and West Africa), has been named assistant to vice president of the department. **Linden B. Arthur,** manager of subsidiary sales in foreign-operations department, has been named manager of foreign crude-oil purchases and sales. **Henry M. Hanbury** has been named general sales manager, foreign operations department. In a realignment of foreign sales duties, four assistant general sales managers have been named. They are: **Jack M. Schippers,** formerly managing director of Regent Oil Co.; **Ronald D. Nelson,** assistant to the senior vice president of Texaco; **John D. Johnson,** manager of foreign bulk sales; and **W. F. Robertson,** Atlanta division sales manager.

Stanford O. Tostengard, foreman of Gulf Refining Co.'s Leeville, La., area, has been named New Orleans district superintendent. He succeeds **J. A. Brown,** who has retired after 40 years with Gulf. In the new post, Tostengard will supervise Gulf's pipeline operations in eastern Louisiana and southern Mississippi.

A. K. Wickham, division foreman for Salt Lake Pipe Line Co. in Pasco, Wash., has been transferred to Boise, Idaho, in the same capacity.

John W. Emison, chairman of Texas Pipe Line Co., has retired after 40 years with the company. Emison was elected president of Texas Pipe Line in 1952 and held this post until a few months ago. He was named chairman in February when **H. S. McCray** succeeded him as president.

L. M. (Larry) Jack, assistant superintendent of right - of - way for Service Pipe Line Co., has been promoted to superintendent. He succeeds **Homer R. Swift,** who recently retired. **Ross H. Foster** will succeed Jack.

Nelson M. Lytle, assistant district superintendent in Interstate Oil Pipe Line Co.'s Sunset district, Opelousas, La., has been transferred to the Billings, Mont., district. He will succeed **H. S. Foote** as superintendent there when Foote retires May 1.

Ernest B. Blease has been elected vice president of Northern Natural Gas Co. and will head the new regulatory and forecasting division. The new division will handle FPC applications and long-range forecasting activity. Blease had been director of rate and budget for Northern.

F. A. Calvert, Jr., Tulsa, is president of Calvert Exploration, new Tulsa contract drilling firm. **H. K. (Tony) Calvert,** Oklahoma City, is vice president.

A. O. Saenger has been named assistant regional marketing manager in Humble Oil & Refining Co.'s Southwest region marketing department, and **Choyce Allison** has been named assistant to the regional marketing manager. **J. C. Wilbourn** previously was named regional marketing manager.

VAN TILBURG

Donald G. Van Tilburg, manager of Mobil International Oil's El Palito, Venezuela, refinery, has been named manager of Socony Mobil Oil Co.'s process-promotion department. He will headquarter in New York. He succeeds **James P. Shambaugh,** who recently joined Mobil Oil Co., Socony's operating division. Van Tilburg had been El Palito refinery manager since 1959.

Warren A. Beman, manager of Mobil Chemical Co.'s new-projects department, has joined Union Texas Natural Gas Corp. as vice president in charge of chemical activities.

Claude E. Peavy, executive vice president, general manager, and a director of Britalta Petroleums, will retire May 1. He will continue with the company in an advisory capacity. Peavy joined Britalta in 1956 after 11 years with Phillips Petroleum Co.

R. L. Rorschach, Warren Petroleum Corp., has been elected chairman of the Tulsa section of American Institute of Chemical Engineers. **R. C. Koeller,** Pan American Petroleum Corp., has been elected vice chairman, and **W. L. Banks,** Western Petroleum Refiners Association, has been named secretary-treasurer.

Deaths

Henry O. Helvie, 80, Peru, Kans., independent operator, died March 31 in a Cedar Vale, Kans., hospital. Helvie formerly was with the old Carter Oil Co. in Tulsa. He retired from Carter in 1945 and began independent operations.

LaDette R. Cross, founder and owner of L. R. Cross Petroleum Products, Syracuse, N. Y., died March 23 at his home in Syracuse after a short illness.

Robert T. Haslam, 73, a consultant and director emeritus of W. R. Grace & Co., and a vice president

▶▶▶ Personals

Ralph L. Cormany has resigned as president of American Association of Petroleum Landmen and also has left Signal Oil & Gas Co., where he was administrative assistant for exploration. He will enter private law practice in Oxnard, Calif. **George R. Bixler,** BBM Drilling Co., Houston, will fill out Cormany's term as association president and has been nominated for president in the 1961-62 term. Others nominated for AAPL offices are **Haden J. Upchurch,** Texas Eastern Transmission Co., Houston, for first vice president; **James A. Walker,** Kern County Land Co., San Francisco, for second vice president; **Robert N. Gadbois,** Shell Oil Co., Calgary, for third vice president; and **G. E. Gotschall,** U. S. Oil of Louisiana, New Orleans, for treasurer. Election is by mail ballot.

P. H. DuVal, manager of Cities Service Petroleum Co.'s natural-gas division, has been named vice president and a director of Cities Service Production Co., a subsidiary. DuVal was manager of natural-gas sales and crude-oil supply and transportation for Arkansas Fuel Oil Corp. before moving to Bartlesville, Okla., from Shreveport, La., a few months ago. He will continue as natural-gas division manager for Cities Service Petroleum.

Dr. Arthur Hersberger, general manager of marketing for Atlantic Refining Co., has been nominated for director of the company. He would succeed **Dwight T. Colley,** vice president, marketing, on the board. Colley will retire May 1.

J. J. O'Brien, vice president in charge of Monterey Oil Co.'s Mid-Continent area before Monterey's sale to Humble Oil & Refining Co., has been named an acting operations superintendent in Humble's Midland area.

F. D. Dennstedt, assistant general manager of Humble Oil & Refining Co.'s Baton Rouge refinery, has been named assistant general manager of Humble's manufacturing division in Houston. Also assigned to the manufacturing division are **F. M. Doughty,** head of the New York manufacturing technical division of Esso Standard, who will be manufacturing coordinator; **J. P. Cogan,** assistant head of the New York technical division, who will be assistant manufacturing coordinator in charge of economic studies; **F. A. Youngs,** assistant controller in New York, division controller; and **P. E. Kuhl,** assistant general manager of Esso's manufacturing department in New York, administrative coordinator. **J. P. Warner** was named vice president and general manager of the manufacturing division in December. Also, **C. H. Kollenberg** was recently named assistant manufacturing coordinator in charge of planning.

M. F. Wirges has been named manager of petrochemical development for Cities Service Research & Development Co. Wirges had been manager of natural gasoline operations, chief engineer and executive assistant to the president of Arkansas Fuel Oil Corp. Wirges has been with the Cities Service companies since 1945.

A. E. Stebbings, general manager of Signal Oil & Gas Co.'s marketing department, has been named a vice president.

James F. Doyle, Bureau of Land Management area administrator in Portland, has been promoted to an assistant director of BLM.

Robert C. Thomas, exploitation engineer with Tenneco Oil Co. in Wichita Falls, Tex., has been promoted to district geological engineer in Oklahoma City.

J. C. (Chris) Sanders, Jr., assistant plant manager of Ethyl-Dow Chemical Co.'s Freeport, Tex., plant, has been promoted to plant manager. He succeeds **V. A. Thorpe,** who has been transferred to Dow's Texas division as general superintendent of alkali products and rectifiers.

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of Standard Oil Co. (N. J.) until his retirement in 1950, died last week in Sarasota, Fla., after a long illness. Haslam joined Jersey in 1927. He is credited with expanding Jersey's research. He was a pioneer in the training of sales engineers and in public relations, serving as chairman of API's advisory committee on public relations which became OIIC.

Charles M. Sheldon, 67, purchasing agent for Mariko Production Co., Tulsa, died April 3 in a Rochester, Minn., hospital after a year's illness. Sheldon, with his father and brothers, owned an interest in the old Sheldon Oil Co., early Oklahoma company which opened the Sheldon pool in Okfuskee County.

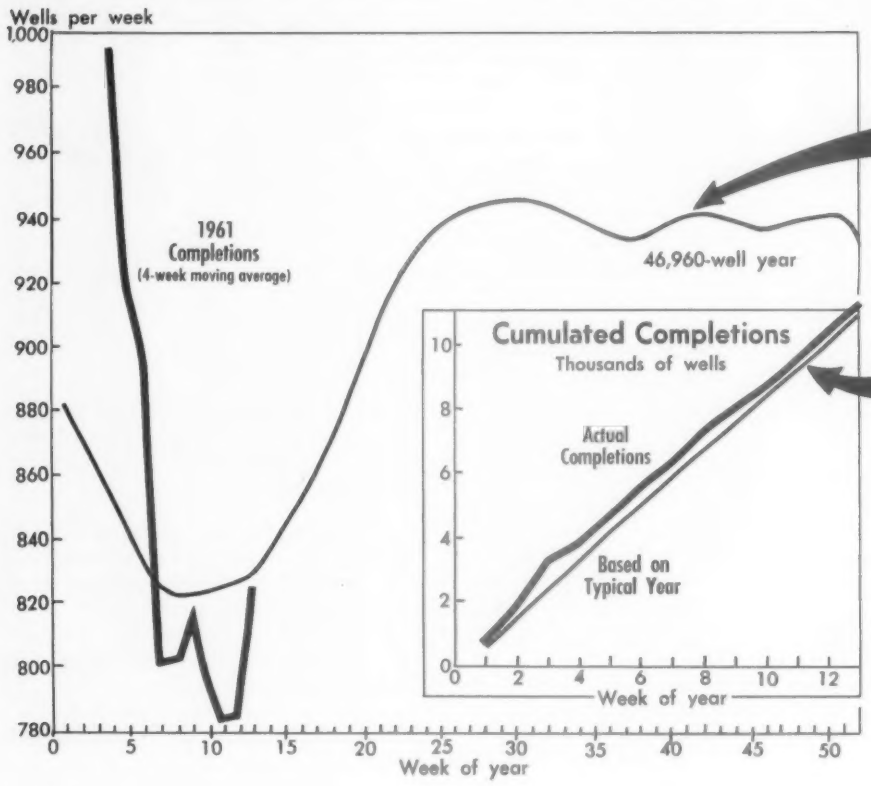
Jack R. White, 53, assistant drilling superintendent for Gulf Coast Drilling & Exploration, Inc., in Laurel, Miss., died March 29 after a heart attack.

Robert R. Lockwood, Sr., 76, former president of the old Sabine Oil & Gas Co., Tulsa, died April 4 at his home in Tulsa after a heart attack.

Henry A. Ruysser, Jr., executive vice president of Black, Sivalls & Bryson, Inc., Kansas City, died March 29. Ruysser was a partner in Smith Engineering Co., Kansas City, before joining Black, Sivalls & Bryson in 1946 as vice president and a director. He became executive vice president in 1955.

Aubrey E. Brummett, 40, president of Production Drilling Specialties Co., Houma, La., was killed March 30 in an auto accident near Houston.

Richard Florian, retired president of Western Oil & Refining Co., died March 28 at his home in Los Angeles. Florian retired in 1949 after over 40 years in the oil industry.



1961 drilling is about on schedule

THE HEAVY LINE on the big chart gives a generalized pattern of drilling for a typical year. It is based on weekly drilling reports for the 1954-60 period with averages adjusted to a smooth curve. Weekly completion totals from the curve add up to 46,690 wells, the Journal's forecast of drilling for 1961.

1961 still looks like a 47,000-well year

BY JOHN C. CASPER

MARCH is the low month of the year for well completions, but it may not be the low month of drilling activity. Commitments on expiring leases tend to increase the number of new locations in the last quarter of the year. In many cases, these wells are completed in the first 2 months of the following year. On the other hand, operators may be a little slow starting on the program for the current year.

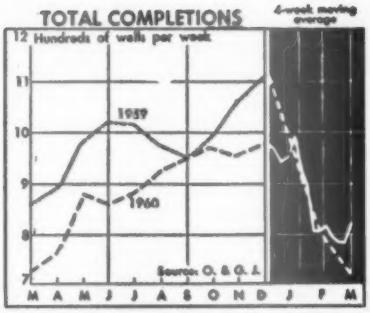
On the big chart, the 4-week moving average for the current year is compared with completions for a typical 47,000-well year. Note that the 4-week average for the current year was at a low point about the middle of March. But the 4-week average for the period ended April 1 was back up to 825 wells per week which is just a little short of the total that would be expected from the curve for a typical 47,000-well year.

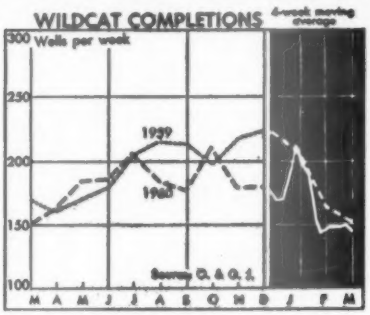
Lines on the insert chart show cumulated completions for the first quarter compared with totals based on the typical year. Operators reported 11,277 completions for the first 13 weeks this year. The total for the first 13 weeks on the typical curve is 10,940 wells. The difference of 337 completions is within the normal range of variations from the typical curve. Operators are about on schedule.

A quick look at the highlights . . .

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	7,348,225	DOWN	17,475	UP	179,787
Crude stocks	238,600,000	UP	3,580,000	DOWN	18,981,000
Completions	937	UP	98	UP	193
Refinery runs	7,855,000	DOWN	42,000	DOWN	61,000
Gasoline stocks	226,449,000	DOWN	219,000	UP	854,000
Kerosine stocks	26,006,000	UP	647,000	UP	8,468,000
Distillate stocks	89,677,000	DOWN	1,126,000	UP	14,558,000
Residual stocks	42,261,000	UP	170,000	UP	3,149,000
Four-product stocks	384,393,000	DOWN	528,000	UP	27,029,000
Total imports	2,147,400	DOWN	65,200	UP	557,900

Active Rotary Rigs





	4-3-61	3-27-61	4-4-60
Alabama	4	5	4
Alaska	7	7	5
Arkansas	15	15	17
Arizona	0	0	4
California	69	72	81
Land	65	68	77
Offshore	4	4	4
Colorado	20	17	23
Florida	0	0	2
Land	0	0	1
Offshore	0	0	1
Georgia	1	1	0
Illinois	17	16	21
Indiana	4	5	2
Kansas	98	77	97
Kentucky	2	2	1
Louisiana	266	269	296
North	23	33	29
S. Inland waters	104	109	125
S. Land	82	71	89
Offshore	57	56	53
Michigan	15	10	33
Mississippi	57	54	55
Missouri	1	0	1
Montana	15	18	12
Nebraska	30	30	26
New Mexico	85	87	108
New York	0	0	1
North Dakota	19	20	21
Ohio	6	6	5
Oklahoma	160	163	197
Pennsylvania	7	7	11
South Dakota	0	0	2
Texas	598	613	635
S. Inland waters	9	9	8
S. Land	167	170	175
Offshore	3	3	2
North	56	53	47
Panhandle	50	47	65
East	55	60	55
West Central	151	156	187
West	107	115	96
Utah	31	32	27
Washington	2	2	0
West Virginia	4	4	4
Wyoming	44	48	55
Total U. S.	1,577	1,580	1,746
Cum. avg. to date	1,561	1,559	1,680
Western Canada	138	167	140
Eastern Canada	0	0	2
Grand total	1,715	1,747	1,888

Hughes Tool Co. report.

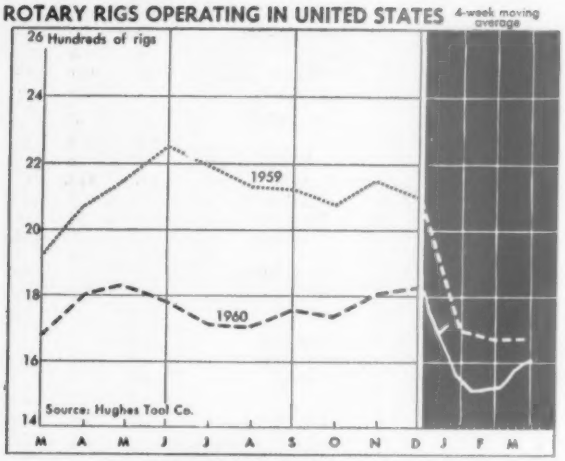
WEEKLY WELL COMPLETIONS . . . WEEK ENDED APRIL 1, 1961

	Total wells							Cum.		Total wildcats					Cum.	
	Total	Crude	Cond.	Gas	Dry	Service	Footage	1961	1960	Total	Crude	Cond.	Gas	Dry	1961	1960
Arkansas	12	5	0	0	7	0	35,543	139	144	1	0	0	0	1	26	37
California	28	17	0	4	6	1	135,718	433	333	4	0	0	1	3	67	73
Colorado	15	1	0	1	13	0	70,192	166	180	8	0	0	0	8	90	83
Illinois	11	1	0	0	10	0	26,887	466	552	6	0	0	0	6	91	146
Indiana	7	3	0	0	4	0	7,211	156	219	1	0	0	0	1	36	94
Kansas	107	66	0	4	25	12	242,252	1,359	819	18	2	0	0	16	257	267
Kentucky	29	8	0	4	15	2	38,600	352	486	2	0	0	0	2	40	59
Louisiana	102	54	0	18	30	0	926,106	898	832	15	1	0	2	12	138	122
North	25	10	0	5	10	0	78,878	316	264	5	1	0	0	4	54	50
South	71	40	0	13	18	0	789,606	468	423	9	0	0	2	7	77	63
Offshore	6	4	0	0	2	0	57,622	114	145	1	0	0	0	1	7	9
Michigan	13	6	0	0	7	0	49,236	170	185	5	1	0	0	4	69	58
Mississippi	9	2	0	1	6	0	86,806	137	204	5	0	0	0	5	49	68
Montana	7	6	0	0	1	0	62,396	104	62	2	1	0	0	1	46	32
Nebraska	28	17	0	0	11	0	127,842	191	191	11	2	0	0	9	81	77
New Mexico	32	11	0	6	15	0	188,887	435	477	8	0	0	0	8	83	64
West	12	3	0	6	3	0	57,878	162	155	3	0	0	0	3	21	13
East	20	8	0	0	12	0	131,009	273	322	5	0	0	0	5	62	51
New York	28	15	0	0	2	11	37,101	175	97	0	0	0	0	0	2	5
North Dakota	7	4	0	0	3	0	49,372	54	81	2	0	0	0	2	13	12
Ohio	21	14	0	2	5	0	35,572	263	282	1	0	0	0	1	11	14
Oklahoma	164	75	0	19	46	24	531,610	1,519	932	11	2	0	2	7	157	181
Pennsylvania	0	0	0	0	0	0	0	152	128	0	0	0	0	0	7	6
Texas	264	135	9	17	102	1	1,171,665	3,445	4,035	51	2	2	1	46	724	830
District 1	8	3	0	1	4	0	35,741	200	290	4	0	0	1	3	79	104
District 2	10	7	1	1	1	0	62,578	166	175	1	0	0	0	1	33	43
District 3	18	7	1	1	9	0	120,496	257	307	3	0	0	0	3	57	59
District 4	31	9	3	4	15	0	175,057	316	313	6	0	1	0	5	67	95
East	26	13	4	0	9	0	133,851	272	302	6	1	1	0	4	64	61
District 7-B	38	16	0	0	22	0	115,314	477	580	12	1	0	0	11	142	169
West	66	49	0	0	16	1	314,305	862	1,053	12	0	0	0	12	181	168
District 9	47	23	0	1	23	0	103,145	575	751	6	0	0	0	6	76	109
District 10	20	8	0	9	3	0	111,178	320	264	1	0	0	0	1	25	22
Utah	5	4	0	0	1	0	31,848	62	68	1	0	0	0	1	29	25
West Virginia	20	2	0	13	4	1	47,763	249	200	0	0	0	0	0	2	1
Wyoming	20	9	0	3	7	1	97,141	268	243	8	0	0	1	7	105	102
Miscellaneous*	8	3	0	0	5	0	40,120	84	45	5	0	0	0	5	60	21
Total U. S.	937	458	9	92	325	53	4,039,868	11,277	10,795	165	11	2	7	145	2,183	2,377
Previous week	839	395	14	67	258	105	3,175,267			136	11	2	6	117		
Cum. 1961	11,277	5,175	244	1,104	3,998	756	45,752,212			2,183	182	28	101	1,872		
Cum. 1960	10,795	5,059	350	913	4,155	318	47,340,421			2,377	216	22	70	2,069		
Western Canada	61	31	0	13	16	1	347,651	624	640	24	4	0	7	13	207	199

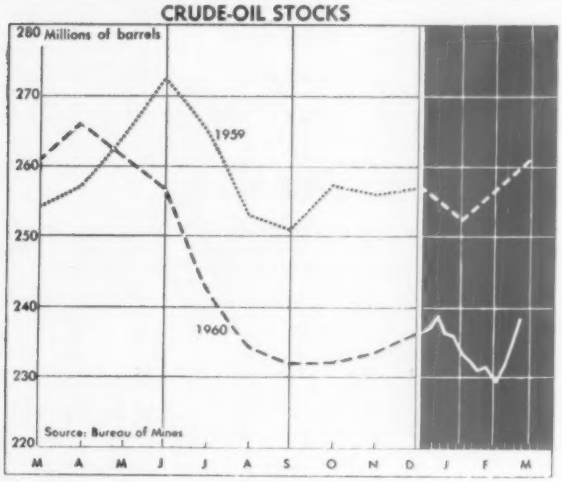
*Nev., Ariz., Mo., Alaska, Ala.

PRODUCTION

ROTARY RIGS OPERATING IN UNITED STATES



CRUDE-OIL STOCKS



CRUDE-OIL STOCKS BY STATES OF ORIGIN*
(Thousands of barrels)

	3-25-61	3-18-61	3-26-60
Pennsylvania	2,132	2,140	2,072
Oher Appalachian	1,297	1,310	1,825
Illinois, Indiana, Michigan	9,331	9,081	9,319
Nebraska and North Dakota	3,182	3,231	2,730
Kansas	9,521	9,297	9,487
Oklahoma	15,726	15,448	16,842
Arkansas	1,692	1,759	2,042
Louisiana	18,468	18,054	19,218
North	3,117	3,107	3,252
South	15,351	14,947	15,966
Mississippi, Alabama, Florida	2,070	1,982	2,931
New Mexico	7,659	7,211	7,329
Texas	99,875	97,884	112,097
East Texas	8,688	8,331	8,617
West Texas	45,184	45,438	50,836
Texas Gulf	17,541	16,444	20,569
Other Texas	28,462	27,670	32,075
Wyoming	16,717	16,951	17,522
Other Rocky Mountain	9,207	9,482	8,657
California	25,147	24,780	29,975
Foreign	†16,576	16,411	14,535
Total	**238,600**	235,020	257,581

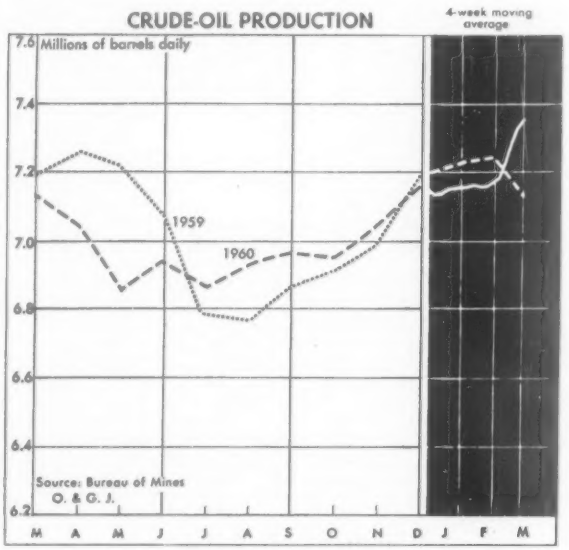
*Bureau of Mines. †Includes 6,149,000 bbl. in California.

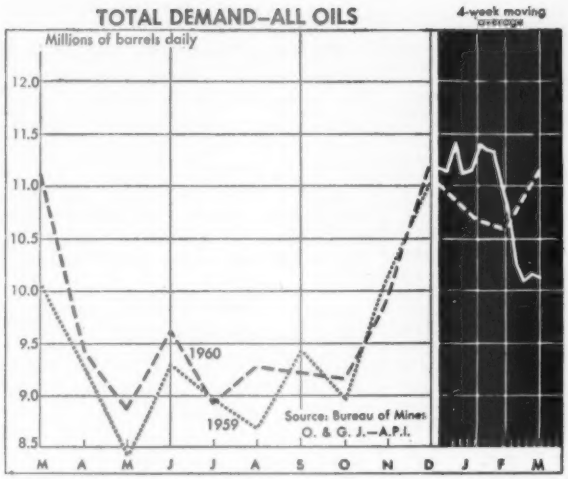
DAILY AVERAGE PRODUCTION FOR WEEK

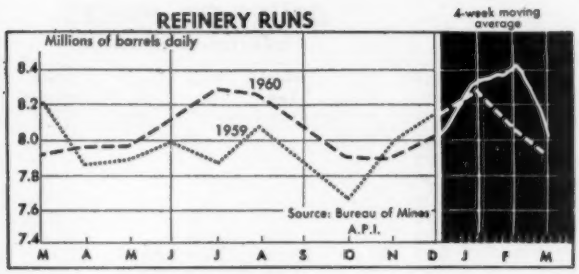
	April 1, 1961			Mar. 25
	Crude oil	Lease condensate	Total	total
Alabama	19,300	.....	19,300	19,250
Alaska	10,000	.....	10,000	10,000
Arkansas	77,400	150	77,550	77,550
California	829,000	.....	829,000	829,000
Colorado	131,900	.....	131,900	131,600
Eastern	39,600	.....	39,600	38,400
Florida	1,025	.....	1,025	1,025
Illinois	208,300	.....	208,300	209,700
Indiana	30,600	.....	30,600	31,200
Kansas	†309,850	.....	†309,850	†313,100
Kentucky	48,200	.....	48,200	56,100
Louisiana	997,900	155,825	1,153,725	1,153,650
North	101,900	5,825	107,725	107,650
South	896,000	150,000	1,046,000	1,046,000
Michigan	53,100	.....	53,100	53,400
Mississippi	146,450	4,525	150,975	150,975
Montana	81,400	.....	81,400	82,000
Nebraska	67,900	.....	67,900	67,500
Nevada	400	.....	400	400
New Mexico	299,000	8,500	307,500	307,500
North Dakota	67,000	.....	67,000	65,600
Oklahoma	†525,000	.....	†525,000	†544,750
Texas	2,658,000	100,150	2,758,150	2,758,150
Dist. 1	44,000	3,700	47,700	47,700
Dist. 2	117,000	8,800	125,800	125,800
Dist. 3	326,000	42,000	368,000	368,000
Dist. 4	192,000	14,000	206,000	206,000
Dist. 5	29,000	500	29,500	29,500
Dist. 6	123,000	9,000	132,000	132,000
East Texas field	142,000	.....	142,000	142,000
Dist. 7-B	134,000	500	134,500	134,500
Dist. 7-C	123,000	3,850	126,850	126,850
Dist. 8	1,130,000	12,000	1,142,000	1,142,000
Dist. 9	192,000	3,800	195,800	195,800
Dist. 10	106,000	2,000	108,000	108,000
Utah	90,600	.....	90,600	80,400
Wyoming	386,400	.....	386,400	383,700
Others	‡750	.....	‡750	‡750
Total U. S.	7,079,075	269,159	**7,348,225**	7,365,700
Change from previous week, down			**17,475**	
Canada	†516,000	.....	†516,000	†553,200
Total U. S. prod., January 1-April 1			658,000,000 bbl.	
Same period last year (crude plus cond.)			*654,946,800 bbl.	

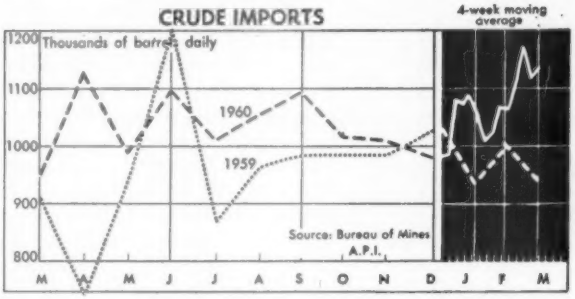
*Includes 20,961,700 bbl. condensate. †Week ended previous Monday. ‡South Dakota and Arizona.

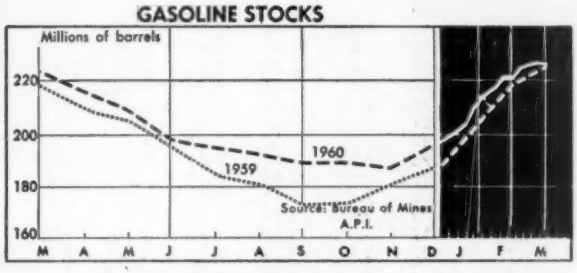
CRUDE-OIL PRODUCTION

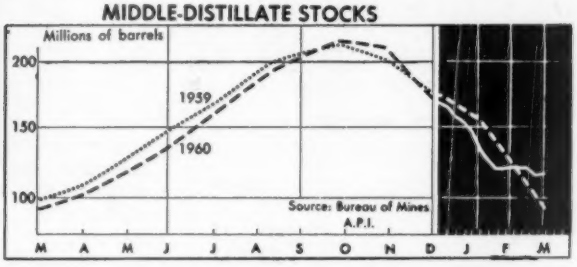


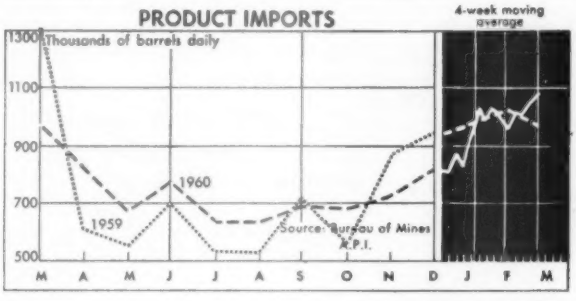


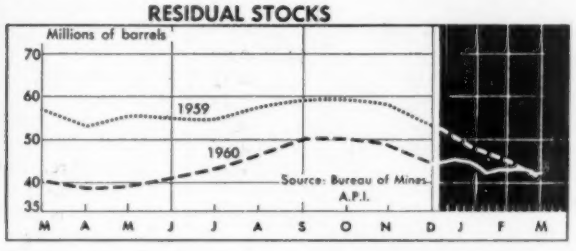












API REFINERY REPORT—MARCH 31, 1961
(Thousands of barrels)

District—	Daily avg. runs	Daily average production: Gaso.*	Kero.	Dist.	Resid.	Stocks‡: Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, March 1960: Daily avg. runs	Daily average production: Gaso.*	Kero.	Dist.	Resid.
East Coast	1,126	473.7	32.0	309.1	157.7	48,890	10,552	27,582	12,056	1,111	525.4	34.1	343.9	170.7
Appalachian:														
District 1	107	36.6	3.3	19.0	13.6	5,999	624	1,962	607	100	39.1	4.4	21.4	12.7
District 2	95	42.0	6.1	17.1	12.6	3,017	400	998	394	102	43.6	8.8	15.8	17.1
Ind., Ill., Ky.	1,446	760.1	76.7	291.4	142.3	42,020	4,255	16,046	5,326	1,468	734.5	77.3	316.9	210.0
Minn., Wis., Dak.	131	58.9	8.1	28.0	19.8	6,942	645	4,551	658	116	55.5	5.8	26.5	19.8
Okla., Kans., Mo.	667	370.1	22.4	145.1	17.9	21,808	1,197	8,305	983	685	380.2	13.0	170.9	43.5
Inland Texas	314	217.6	11.4	49.7	17.6	8,403	645	1,537	2,498	286	211.6	8.9	51.8	19.2
Texas Gulf Coast	1,783	1,029.9	129.7	439.7	123.0	32,132	2,837	7,500	4,341	1,864	940.9	124.1	418.3	136.5
La. Gulf Coast	626	358.9	66.3	152.0	62.4	11,629	2,348	4,109	1,419	645	358.7	52.1	142.3	44.2
N. La. and Ark.	116	71.0	3.9	25.0	8.1	6,467	520	2,244	153	100	65.8	4.0	21.8	7.1
Rocky Mountain:														
New Mexico	25	11.7	0.3	6.9	2.6	757	36	161	103	25	12.5	0.5	4.1	2.8
Other Rocky Mt.	266	125.4	2.4	60.7	33.1	7,983	374	2,116	1,030	280	130.1	3.4	64.4	33.7
West Coast	1,153	545.7	56.1	169.9	274.3	29,402	1,573	12,566	12,693	1,135	539.6	29.9	198.4	284.8
Mar. 31, 1961	7,855	4,100.6	418.7	1,713.6	885.0	226,449	26,006	89,677	42,261	7,917	4,037.5	366.3	1,796.5	1,002.1
Mar. 24, 1961	7,897	4,065.4	376.7	1,690.1	948.4	226,668	25,359	90,803	42,091	.....	.....	.....	.....	.....
Apr. 1, 1960	7,916	3,995.4	344.9	1,870.1	973.0	225,595	17,538	75,119	39,112	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

CRUDE-OIL PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.	Oklahoma	West Tex. (sour)	West Tex. (inter.)	No.* Texas	Texas Refugio Light	Bayou Sale (La.)	Denver Julesburg	Wyo. (sour)
14-14.9	$1.86	.....	.....	.....	.....	.....	.....	.....	.....
15-15.9	1.93	.....	.....	.....	.....	.....	.....	.....	$1.81
16-16.9	2.00	.....	.....	.....	.....	.....	.....	.....	1.86
17-17.9	2.06	.....	.....	.....	.....	.....	.....	.....	1.91
18-18.9	2.13	.....	.....	.....	.....	.....	.....	.....	1.96
19-19.9	2.20	.....	(†)	.....	.....	.....	.....	.....	2.01
20-20.9	2.27	$2.49	$2.35	$2.61	$2.29	$2.95	$2.90	$2.58	2.06
21-21.9	2.33	2.52	2.38	2.63	2.33	2.97	2.92	2.60	2.11
22-22.9	2.40	2.55	2.41	2.65	2.37	2.99	2.94	2.62	2.16
23-23.9	2.46	2.58	2.44	2.67	2.41	3.01	2.96	2.64	2.21
24-24.9	2.53	2.61	2.47	2.69	2.45	3.03	2.98	2.66	2.26
25-25.9	2.60	2.64	2.50	2.71	2.49	3.05	3.00	2.68	2.31
26-26.9	2.67	2.67	2.53	2.73	2.53	3.07	3.02	2.70	2.36
27-27.9	2.74	2.70	2.56	2.75	2.57	3.09	3.04	2.72	2.49
28-28.9	2.81	2.73	2.59	2.77	2.61	3.11	3.06	2.74	2.54
29-29.9	2.87	2.76	2.62	2.79	2.65	3.13	3.08	2.76	2.59
30-30.9	2.93	2.79	2.65	2.81	2.69	3.15	3.10	2.78	2.63
31-31.9	3.00	2.82	2.68	2.83	2.73	3.17	3.12	2.80	2.67
32-32.9	3.06	2.85	2.71	2.85	2.77	3.19	3.14	2.82	2.71
33-33.9	3.12	2.88	2.74	2.87	2.81	3.21	3.16	2.84	2.75
34-34.9	3.17	2.91	2.77	2.89	2.85	3.23	3.18	2.86	2.79
35-35.9	3.22	2.94	2.80	2.91	2.89	3.25	3.20	2.88	2.83
36-36.9	3.27	2.97	2.83	2.93	2.93	3.27	3.22	2.90	2.87
37-37.9	3.31	2.99	2.86	2.95	2.95	3.29	3.24	2.92	2.89
38-38.9	.....	3.01	2.89	2.97	2.97	3.31	3.26	2.94	2.91
39-39.9	.....	3.03	2.92	2.99	2.99	3.33	3.28	2.96	2.93
40-44.9	.....	3.05	2.95	3.01	3.01	3.35	3.30	2.98	2.95

*Cooke, Grayson, Montague. †Two buyers announced increase.

FLAT PRICES

Louisiana:
- Sweet Lake $3.00

Texas:
- East Texas 3.05-3.25
- Conroe 3.23-3.53
- Van 3.08

Pennsylvania Grade:
- Bradford $4.75-4.80
- Middle District 4.52
- Southwest Pennsylvania 4.25
- West Virginia 4.17
- Buckeye Grade 4.08

Illinois Basin **3.00-3.05**

FOREIGN

Middle East, Persian Gulf: (cargoes f.o.b. lifting port)
- Arabian, 34.0°-34.9°, Ras Tanura $1.80
- Iranian, 34.0°-34.9°, Bandar Mashur 1.78
- Iranian, 34.0°-34.9°, Abadan 1.73
- Iraq, 35.0°-35.9°, Fao 1.72
- Kuwait, 31.0°-31.9°, Mina-al-Ahmadi 1.59
- Qatar, 41.0°-41.9°, Umm Said 1.95

Middle East, E. Mediterranean:
- Arabian, 34.0°-34.9°, Sidon $2.17
- Iraq, Mosul-Kirkuk, 35.0°-35.9°, Tripoli 2.19

Far East (cargoes, f.o.b. Lutong, Sarawak):
- Seria Light, 36° 2.42

Canada:
- Leduc-Woodbend $2.53
- Redwater (Alta.) 2.42
- Weyburn (light) 2.06
- Midale C 1.70

Venezuela:
- Cumbarebo, 47°-47.9°, Tucupido 3.34
- San Joaquin, 40°-40.9°, Puerto La Cruz 3.08
- Oficina, 35°-35.9°, Puerto La Cruz 2.80
- Tia Juana medium, 26°-26.9°, Amuay* 2.30
- Quiriquire, 16.0°-16.4°, Caripito 2.10
- Lagunillas heavy, flat, Las Piedras* 2.10
- Bachaquero, flat, 15°-16°, Las Piedras* 1.88

Prices for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

TANKER RATES (Long Ton)

(Latest reported spot fixtures)

- Carib.-NY, dirty (ATRS—60%) $1.10
- ★ Carib.-UK, dirty (Scale—60%) (13s. 0d.) 1.82
- ★ Carib.-Gulf, clean (ATRS—65%) 0.93
- ★ PG-Japan, dirty (USMC—68%) 3.26
- ★ Carib.-Cal., dirty (ATRS—62.5%) 2.03

★ Denotes change from previous week.

REFINED PRODUCTS

Following quotations are realistic spot prices for refined products moving interstate on Wednesday each week. They may differ from refiners' posted prices and should not be considered as postings.

Light-product prices are in cents per gallon. Residual and crude prices are dollars per barrel. Crude prices are at the well unless otherwise listed.

GASOLINE*

Mid-Continent (Group 3):
- ★ Regular (91 octane) 12.25-12.50
- ★ Premium (99 octane) 15.00-15.25
- Natural gasoline (26-70) 4.5
- Breckenridge 4.0

Gulf Coast (cargoes for coastwise or export movements):
- Regular (90 octane) 10.50-11.00
- Regular (92 octane) 10.75-11.25
- Premium (98 octane) 11.75-12.25

California (rack) Los Angeles:
- Regular (90 octane) 11.00
- Premium (94 octane) 12.00
- Premium (100 octane) 13.50

Caribbean area (cargoes):
- Regular (87 octane) 9.50
- Premium (97 octane) 11.625

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

KEROSINE AND DISTILLATE

Mid-Continent (Group 3):
- Kerosine 42-44 ..... 10.375-10.625
- Diesel oil (58 d.i. and above) 10.00-10.25
- Distillate No. 1 ..... 10.00-10.25
- Distillate No. 2 ..... 9.00-9.25

Gulf Coast (cargoes):
- ★ Kerosine 41-43 ..... 9.625-9.875
- ★ Distillate No. 2 ..... 9.00-9.25

New York Harbor (barges):
- Kerosine 42-43 ..... 11.40
- Distillate No. 2 ..... 10.40
- Diesel fuel, 48-52 d.i. 10.55

Caribbean area (cargoes):
- Distillate No. 2 ..... 8.625

RESIDUAL FUEL (Bbl.)

Mid-Continent (Group 3):
- Residual fuel (max. 1% S) $1.90

Gulf Coast (cargoes):
- Bunker C fuel 2.20

New York Harbor (barges):
- Bunker C fuel 2.52

Caribbean (cargoes):
- Bunker C 2.00

California (rack):
- Bunker C fuel, Los Angeles 2.25

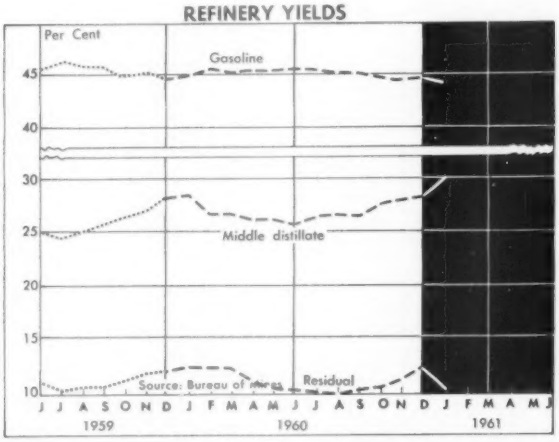
SUPPLY AND DEMAND—PRODUCTS

(Thousands of barrels daily)

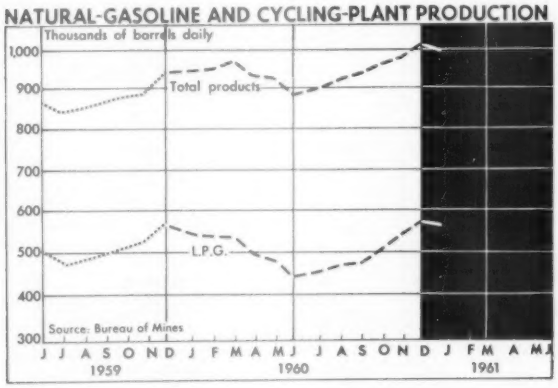
	Total demand	Refinery production	Stocks end of period†
GASOLINE			
March 1961*	3,990	4,060	226,400
February 1961*	3,900	4,080	221,100
January 1961	3,726	4,204	211,867
April 1960	4,357	4,115	216,100
March 1960	3,928	4,092	222,691
KEROSINE			
March 1961*	370	425	26,000
February 1961*	515	430	24,000
January 1961	586	447	27,365
April 1960	257	325	20,547
March 1960	517	366	18,440
DISTILLATE			
March 1961*	2,075	1,795	89,700
February 1961*	3,155	2,085	109,200
January 1961	3,131	2,078	108,097
April 1960	1,539	1,743	81,755
March 1960	2,843	1,796	73,948
RESIDUAL			
March 1961*	1,895	910	42,300
February 1961*	1,870	970	43,100
January 1961	1,937	964	42,934
April 1960	1,584	880	39,285
March 1960	2,015	1,002	40,503

*Preliminary. †Thousands of barrels.

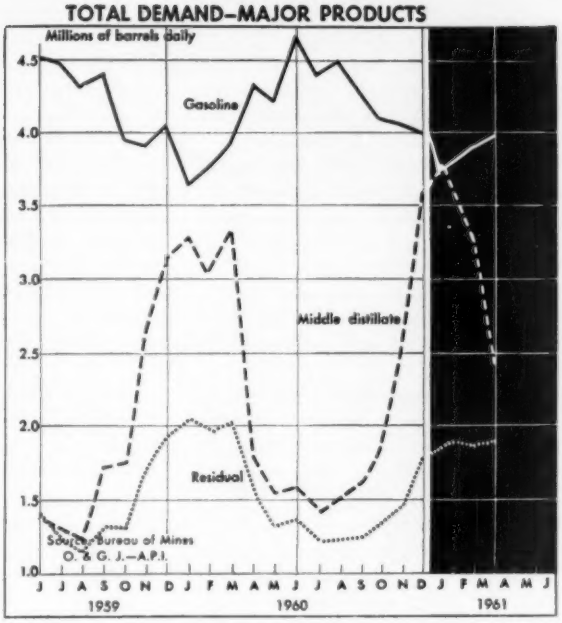
REFINERY YIELDS



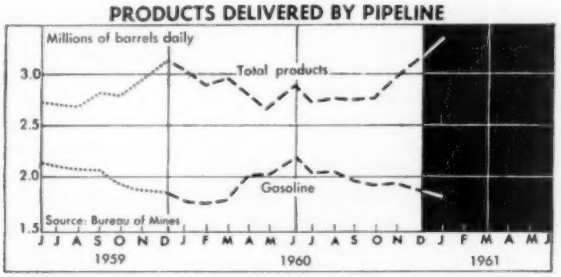
NATURAL-GASOLINE AND CYCLING-PLANT PRODUCTION



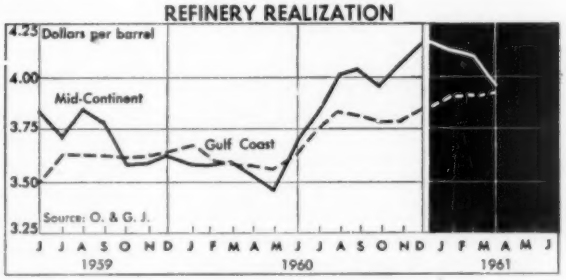
TOTAL DEMAND–MAJOR PRODUCTS



PRODUCTS DELIVERED BY PIPELINE



REFINERY REALIZATION



REFINERY REALIZATION

	Mar.*	Feb.*	Jan.	Dec.
Mid-Continent	$3.96	$4.09	$4.02	$4.12
Gulf Coast	3.93	3.92	3.96	3.82

*Preliminary. Refinary realization is based on yields of major products and average spot prices of regular gasoline, kerosine, No. 2 fuel and residual as published in The Oil and Gas Journal.

Viola oil pool opened in Montague, North Texas

Southwestern Montague County in North Texas has a good Viola Ordovician discovery at Jack Grace Production Co. 1 Skinner and Jackson, 2 miles west of Bowie.

The well flowed 792 bbl. of oil per day on 15/64-in. choke from Viola at 6,734-71 ft. This opens Viola production in this part of the county. New field name asked is Bowie, West Viola limestone. Location is in Section 2858, TE&L Survey, southeast of Anson oil field.

Second Texas Abo. The second Abo reef field for Texas is shaping up in eastern Yoakum County, 9 miles east of Plains. The prospective pool opener is Sunray 1-A Mattie Powell in Section 4, Block D, John H. Gibson Survey, 1 mile northeast of Ownby field production and 1½ miles southwest of Cobb field. Last gage reported was 87 bbl. of new oil plus 20 bbl. load water in 24 hours on pump from perforations at 8,305-54 ft. Testing continues on pump.

New Mexico. Ohio Oil Co. 2 Lea unit-federal, northeast offset to 1 Lea unit-federal, a Devonian and Bone Spring discovery in Lea County, 15 miles southwest of Monument, was testing through Devonian and Bone Spring perforations. From Devonian at 14,387-14,461 ft. flow was 413 bbl. of oil per day through 16/64-in. choke. From Bone Spring at 9,590-9,620 ft. it flowed 78 bbl. daily. Location is in 12-20s-34e.

Strawn discovery confirms new West Texas production

A Strawn Pennsylvanian reef well, Cities Service Oil Co. 1 Mears, ¼ mile northeast of one-well Levelland-Strawn field, Hockley County, 1 mile east of Levelland in West Texas, flowed 91 bbl. of oil in 5 hours through various chokes. Drillstem test was made in the reef at 10,105-24 ft. Location is in Labor 25, League 27, Lamar CSL Survey. It confirms Levelland-Strawn field.

Kent County. Ohio Oil Co. completed flowing Strawn production in central Kent County, 5 miles northeast of Clairemont. The 1 Nellie McLaury A/C 1 flowed 239 bbl. of oil per day through 20/64-in. choke from perforations at 6,609-11 ft. Location is in W. P. Wilson Survey 7, 2 miles northeast of North Clairemont field and 3 miles south of Boomerang-Pennsylvanian field.

Andrews County. Humble Oil & Refining Co. 4-AL State University, Hutex-Devonian field, is a Bend Pennsylvanian discovery. The well flowed 58 bbl. per day through ¼-in. choke from Bend at 11,787-92 ft. Location is in Section 14, Block 8, University Lands Survey, 18 miles northwest of Andrews.

Martin County. Husky Oil Co. 1-A Hill, northeastern Martin County wildcat, 19 miles north of Stanton, was completed flowing 247 bbl. of oil daily plus 2% water through 20/64-in. choke from Dean sand. Perforations were made at 8,462-8,502 ft. Location is in Section 62, Block A, Bauer & Cockrell Survey, 10 miles southwest of East Ackerly field.

Big gas-condensate well finaled in South Oklahoma

Another big gas-condensate well was completed in southern Oklahoma's East Marietta area at Southwest Enville, Love County. The well is Texaco Inc. 1 Bowen in NE SW SE 12-7s-3e.

The well, extending Southwest Enville field to the south, flowed 30 M.M.c.f.d. and 2,781 bbl. condensate per day flowing through Oil Creek Ordovician at 10,924 ft.

Discovery wells

OKLAHOMA

Kingfisher County:
Harper Oil Co. et al. 1 O'Hern, NE NW 16-18n-5w. IPF 425 BOPD, Meramec 6,424-25 ft. TD 6,525 ft.

Love County:
A. D. Britton 1 Smith-McGehee, SE NE 25-8s-1e. IPF 480 BOPD, Dillard sand 7,310-15 ft. TD 7,928 ft.

Major County:
Arkansas-Louisiana Gas Co. 1 Ott "A," SE NW 27-21n-9w. IPF 672 BOPD, 33°, Manning 7,084-92 ft. TD 7,540 ft.

Okfuskee County:
Sinclair 1 Diehl Est., NW NW SW 4-13n-7e. IP 54 BOPD, Skinner 2,853-62 ft. TD ?

Osage County:
Appleton Oil Co. 3 Robinson, SE SE NW 3-28n-8e. IP 17 BOPD, 33°, Miss. Chat 2,338-43 ft. TD 2,391 ft.

TEXAS PANHANDLE

Lipscomb County:
Odessa Natural Gas Co. 1 L. E. Harris, 4 miles northwest of Follett in Sec. 10, Blk. 10, HT&B Sur. IPAOF 2,850 M.c.f.d., plus 460 BDPD, SITP 1,825 psi., SICP 1,875 ft. Morrow 8,631-47 ft. TD 9,200 ft. Gas-condensate discovery.

SOUTHWEST TEXAS

Jim Wells County:
Trident Corp. 1 Hoselscher, Los Presenos Abajo Grant, A-171, 5 miles northeast of Alice. IP 152 BOPD, ⅛-in., 34.2°, TP 1,050 psi., GOR 1,300 cu. ft. per bbl., perf. 5,068-71 ft., Frio. TD 5,105 ft. Discovery well of South Little Rose field (3,250 ft. northwest of 1 Bird, gas-discovery well).

McMullen County:
Thomas Drilling Corp. and H & J Drilling Co. 1 Pallie Henry Edwards, Section 27, T&NO Sur., A-480, 4 miles northwest of Tilden. IP 94 BOPD (net), 40% water, P-37 choke, 28.5°, TP 450 psi., GOR 225 cu. ft. per bbl., perf. 3,531-40 ft., Carrizo. TD 3,713 ft. New oil discovery in Henry area.

WEST CENTRAL TEXAS

Jones County:
Prorated in Regular field. Jones & Stasney 1 Mary E. Hood, 7 miles southwest of Stamford in Sec. 62, Blk. 1, BBB&C Sur. IPP 42 BOPD, 41°, GOR 400:1, King sand open hole 2,706 ft. TD 2,709 ft. New oil discovery.

Shackelford County:
Prorated in Regular field. Callihan Interests, Inc. 1-F F. G. Coates, 10 miles southeast of Leuders in Sec. 29, Blk. 13, T&P Sur. IPP 26 BOPD, plus 25% water, 36°, lower Cook sand 1,706-11 ft. TD 1,855 ft. New oil discovery.

Stephens County:
Harding Brothers et al. 2 S. P. Robertson, 15 miles north of Breckenridge in A. S. Johnston Sur. 56. IPF 95 BOPD, 10/64-in. choke on 2-in. tubing at 3,558 ft., 40°, GOR 1,450:1, Upper Caddo 3,564-76 ft.; IPF 394 BOPD, 10/64-in. choke on 2-in. tubing, at 4,335 ft., 41.5°, GOR 1,050:1, packer, TP 490 psi., Miss. 4,340-76 ft. TD 4,438 ft. New dual oil discovery.

EAST TEXAS

Titus County:
Sunray Mid-Continent Oil Co. and British-American Oil Producing Co. 1 Alvin Blalock, Samuel A. Boase Sur., A-56, 9 miles east of Talco. IP 72 BOPD, 22°, perf. 3,634-40 ft., Woodbine; and 7 BOPD, 22.3°, perf. 3,473-81 ft., Woodbine. TD 4,015 ft. Discovery well of East Trix-Liz field.

NORTH TEXAS

Clay County:
Cooperative Refining Co. 1 Coody, 5 miles south of Henrietta in Blk. 42, Orange CSL Sur. IPF 351 BOPD, 20/64-in. choke, 40°, GOR 452:1, TP 100 psi., packer. Strawn 4,953-58 and 4,972-78 ft. TD 6,356 ft. New oil discovery.

Hardeman County:
Conley field. Phillips Petroleum Co. 1 Conley "A," 6 miles southeast of Quannah in Sec. 82, Blk. H, W&NW Sur., A-894. IPF 131 BOPD, Palo Pinto 5,235-65 ft., 44.2°, 10/64-in. choke, GOR 320:1, TP 200 psi., CP 210 psi.; IPF 144 BOPD, 16/64-in. choke, 44.1°, GOR 350:1, TD 120 psi., packer, Miss. 8,004-8,100 ft.; IPF 151 BOPD, 20/64-in. choke, 45.9°, GOR 350:1, packer, TP 60 psi., Osage 8,118-32 ft. TD 8,285 ft. PBTD 8,200 ft. Triple oil discovery.

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Box M-340, The Oil and Gas Journal
Tulsa, Oklahoma

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Box M-338, The Oil and Gas Journal
Tulsa, Oklahoma

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SALE OF OIL AND GAS MINING LEASES, TRIBAL AND ALLOTTED INDIAN LANDS, Department of the Interior, Bureau of Indian Affairs, Uintah and Ouray Agency, Fort Duchesne, Utah. SEALED BIDS will be received until 2:00 P.M. Mountain Standard Time, May 2, 1961, and opened at that time in the office of the Uintah and Ouray Agency, Fort Duchesne, for the leasing of 31,400.22 acres of Tribal Indian lands, and 3,530.42 acres of allotted Indian lands, located in Townships 3, 4 and 5 South, Ranges 1, 2 and 3 East, Uinta meridian, Uintah County, Utah, for oil and gas mining purposes. Details of the lease offering and how and where to file bids may be obtained by addressing an inquiry to the Superintendent, Uintah and Ouray Indian Agency, Fort Duchesne, Utah.

LEGAL

SEALED BIDS WILL BE RECEIVED until 2:00 P.M., Central Standard Time, April 27, 1961 and opened at that time in the office of the Superintendent, Fort Berthold Indian Agency, New Town, North Dakota, for the leasing of 361.29 acres of Tribal land and 24,999.58 acres of Allotted Indian land, located in Townships 147 North, Ranges 92, 94 and 95 West; 148 North, Ranges 92, 93 and 94 West; 151 North, Ranges 93 and 94 West, in the Counties of Dunn, McKenzie and Mountrail, North Dakota, for oil and gas mining purposes. The details of the lease offering and how and where to file bids may be obtained by addressing the inquiry to the Superintendent, Fort Berthold Agency, New Town, North Dakota.

ADVERTISERS . . . in this issue

A

ACF Industries, Incorporated, W-K-M Division 8, 9
Adsco Division, Yuba Consolidated Industries, Inc., ... 121
American Iron & Machine Works Company Subsidiary, American Machine & Foundry Company ..... Back Cover
American Machine & Foundry Co. American Iron & Machine Works Co., ... Back Cover
Atlas Pipe Inc. 147

B

B and W, Inc., ... 150, 151
Babcock & Wilcox Company—Tubular Products Division, The 56
Baker Oil Tools, Inc. 58
Baroid Division, National Lead Co. 47
Barton Instrument Corporation 50
Bethlehem Steel Company 48, 49
BJ Service, A Subsidiary of Borg-Warner Corporation 24, 25
Black, Sivalls & Bryson, Inc. 4
Bonney Forge & Tool Works 139
BrakeSol, Inc. 146
Brown & Sharpe Mfg. Co. 132
Business Reports, Inc. 162

C

Cameron Iron Works, Inc. 159
Cardwell Mfg. Co., Inc. 5
C-B Southern, A Division of The Cooper-Bessemer Corporation 11
Cherokee Laboratories, Inc. 158
Chevrolet Division of General Motors 34
Chiksan Company 23
Classified Advertising 175, 176
Colorado Fuel and Iron Corp. 109
Continental-Emsco Company, a Division of the Youngstown Sheet and Tube Company 19
Curtiss Wright Corporation, Marquette Division 46

D

Daniel Orifice Fitting Company 86
Davison Chemical Company Division of W. R. Grace & Co. 13
Dover Corporation—W. C. Norris Division 54, 163
Dowell 10, 92, 149
Dresser Manufacturing Division 136
du Pont 17, 27

E

Edward Valves, Inc. 33
Enardo Manufacturing Company 134

F

First National Bank & Trust Co. of Tulsa 140
Ford Motor Company 60

G

Gardner-Denver Company 55
Gaso Pump & Burner Mfg. Co. 22
Gates Rubber Co., The 39
General Mills, Inc., Chemical Division 112
Globe Oil Tools Co. 148
Goodyear Tire & Rubber Company, The Industrial Products Division 2, 3
Grace & Co., W. R.—Davison Chemical Division 13
Grove Valve and Regulator Company 135

H

Halliburton Company 6, 7, 83
Harrison Radiator Division, General Motors 16
Henson, Kenneth W. 146
Houston Contracting Company 18
Huey & Co., S. E. 146
Hughes Tool Co. 90, 91
Humble Oil & Refining Co. 71
Hutchison Manufacturing Company .. 141

J

Johnston Testers, Inc. 40
Jones & Laughlin Supply Division .. 44, 45

L

Larkin Packer Company—Division Koehring Company 138
Leland Equipment Company 137
Line Scale Division, Little Giant Corporation 52
Lufkin Rule Co., The 130

M

Magnet Cove Barium Corp. 28
Maloney-Crawford 144
Martin-Decker Corp. 133
Mayo Hotel, The 146
Minneapolis-Honeywell Regulator Co., Industrial Division 14, 15
Mission Mfg. Company 126
Mobil Oil Company 110, 111
Mountain Iron and Supply Company .. 78
Mullins Mfg. Co., Inc. 53

N

National Supply Division of Armco Steel Corporation 35, 36, 37, 38
National Tank Company 178
Norris, W. C., Division of Dover Corporation 54, 163

O

Oil Center Tool Co. 30
Oil Well Supply Division 21
Otis Engineering Corporation 26

P

Peerless Pump Division of Food Machinery & Chemical Corporation .. 89
Petroleum Electric Power Assn. 31
Pittsburgh Steel Company 152
Procon Incorporated 20

Q

Quincy Compressor Co. 52

R

Radio Corporation of America 125
Reda Pump Company 137
Reed Roller Bit Company 129
Robbins & Myers, Inc. 143
Roper Hydraulics, Inc. 144

S

Scott-Rice Company 146
Security Engineering Division, One of the Dresser Industries 43
Southwest Equipment Co. 146

T

Templeton, Kenly & Co. 52
Timken Roller Bearing Company ..... Inside Front Cover
Trinity Portland Cement Division, General Portland Cement Company 51
Tube-Kote, Inc. 75
Tulsa Paper Company 133

U

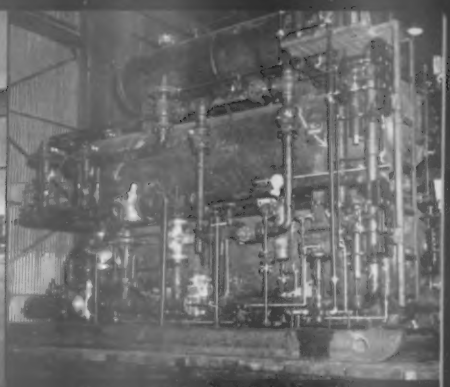
United States Steel Corporation—Oil Well Supply Division 21
Universal Oil Products Company 12

W

Wagner Electric Corporation 41
Walworth Co. 1
Well Equipment Mfg. Corp. 29
Williamson, Inc., T. D. 32
W-K-M Division of ACF Industries Incorporated 8, 9
Wyandotte Chemicals—Michigan Alkali Division 145
Wyatt Industries, Inc. .. Inside Back Cover

Power Boilers

Petro-chemical Process Column



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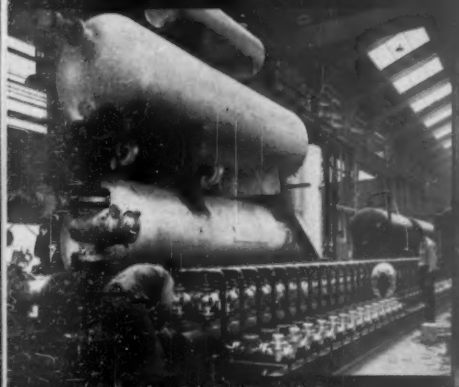

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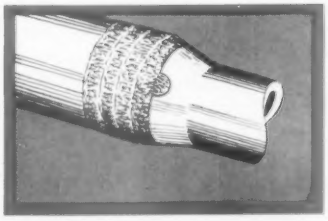

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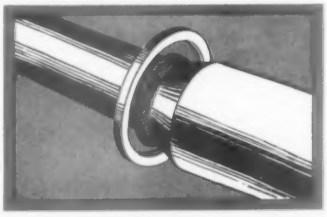
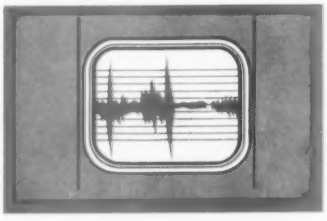


3 The REFLECTOSCOPE is a new electronic testing apparatus used by American Iron for inspecting the weld zone for inclusions and defects. This assures you of maximum performance from your string of Flash Welded Tool Joints!



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